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VIEWS, NEWS AND INTERVIEWS.

"There is one lesson taught by the general adoption of the electric light that we in New York and our neighbors in Brooklyn do not seem to have profited by so much as have the powers and people in many other cities," said a traveler to a reporter for the New York *Sun*. "In the desire to make the very best showing for the new light, the electricians have devoted much care to shades and reflectors designed to throw the light downward, on desk, table, or sidewalk. The incandescent lights are topped in all cases by white glass, or silvered reflectors, which throw all the light downward, where it is needed. The old style of street lamp is so constructed as to give the most light upward, out of the top and toward the stars. The thick frame casts a big shadow on the sidewalk, and a thick support, with big cross-arms, further obstructs and shuts off the light. In very many cities and towns I visit, here and in Europe, new lamps, embodying the lesson taught by the electric light, are in general use where gas is still used, or at least the tops of the old lamp frames are filled with white opaque glass. The difference in the amount of light thus derived from the same burner is remarkable."

It is reported that there is a real difficulty in obtaining practical electricians in Paris.

In the British House of Commons recently, Mr. Mundella stated that the work of connecting the Kentish Knock light-vessel with the shore by telephone is now in progress. Lundy Island has been connected. Either the Tuskar or Gunfleet light will be put in hand at once, and the Chancellor of the Exchequer has also authorized the connection of the Goodwin (North Sand Head) light-vessel. All the shore lighthouses recommended, except that at the Needles, which is now in hand, have been already telephonically connected with the land. The experiment of connecting the Fastnet lighthouse with Crookhaven by a non-continuous cable has not yet been carried out.

The stories about cats committing suicide by allowing trolley cars to run over them are not believed by a certain motorman of Brooklyn. "Them animals," he says, "gets confused. You can see that they don't want to get hurt no more nor a man would, but when they see cars coming both ways, and horses and wagons, and crowds on the sidewalks, and hears the noises, they don't know which way to go. They lose their senses most at night, because the lights seem to scare 'em. Since I've been running a trolley car I've run over half a dozen of 'em, and they all squatted down on the rails. But they didn't mean suicide."

The St. Louis city authorities have decided to build one or more electric ambulance cars for use in street car and other accidents. The various street railways have consented to supply power and the free use of their tracks, and the car will be switched and run to any point desired. A contract has been let for the construction of the first car.

One of the most complicated interlocking plants in the world has recently been put in operation at Stewart avenue, Chicago. The tracks of five railroads cross here, and five other roads, not included in this reckoning, have running rights over the tracks. Transfer tracks and yards are also located at this point. It is hardly possible to estimate the train movements over the crossing in 24 hours, but it is said that there is scarcely a minute when a train is not in sight. The system used is the Westinghouse electro-pneumatic. There are 84 signals, 37 signal switches, 22 double slips and 22 movable frogs, all of them worked from a machine having 48 working levers, and six spare spaces occupying a floor space five feet by 24 feet. There is about 10,000 feet of detector bar, the largest amount ever worked from one machine. With a mechanical machine, according to American practice, a machine of 187 working levers occupying a floor space of 14 feet by 77 feet would be required; and if the English practice were followed, a machine of 243 working levers and a floor space 17 feet by 93 feet would be necessary. An interesting feature of this plant is the illuminating of each signal by electricity, the current for which is supplied from the power house.

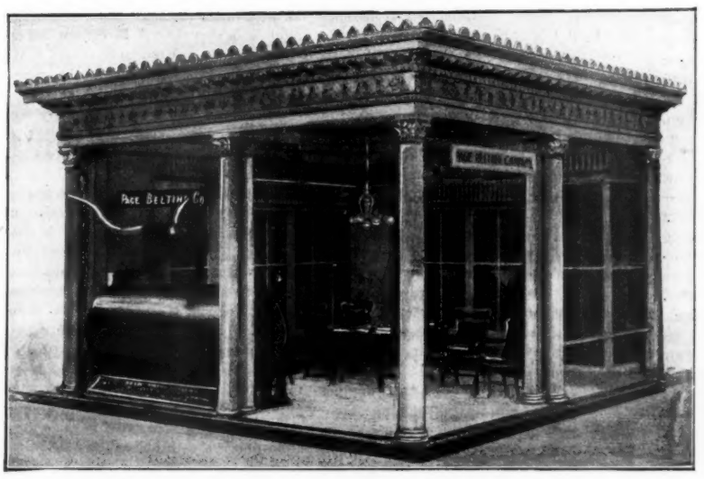
Commissioner Rickard and Secretary Hudson, of the State Railroad Commission, are in Brooklyn this week. They will begin an investigation of the operation of the electric roads in that city with a view of restricting the speed of motor cars. It is likely that as a result of this investigation the commission will promulgate an order restricting the speed of motor cars on all of the electric roads in the State, more especially as regards Brooklyn roads.

The Westinghouse Electric Company has been granted permission to begin experiments in electric propulsion on the canal on the Rochester level at Pittsford, N. Y.

An Electric Fire Engine.

F. H. Wheelock, engineer of the Franklin school, of St. Paul, Minn., has exhibited to the St. Paul board of fire commissioners an electric fire engine, and he offers to the city the free use of a system which he has invented, which involves the substitution of electricity as the motive power for all steam fire engines, and a large reduction in the cost of operating the department. Mr. Wheelock, in describing his electric engine, said one of its chief merits is its light weight and high power as compared with the steam engines at present in use. The steamers weigh from 9,000 to 9,900 pounds and are 18 horse-power, while the electric engine weighs but 4,500 pounds and is 100 horse-power, which could easily be doubled if needed. The heavy boiler and machinery is done away with, and one man and one horse would be dispensed with for each engine, and the city would not have to purchase 400 tons of hard coal for the department, as at present.

To use the electric fire engines, the city would have to put in an electric plant consisting of two 300 horse-power dynamos, one of which would be held in reserve in case of accidents. A wire to carry the current with connections to each hydrant would have to be laid. When the first cost of this had been paid, and Mr. Wheelock says it would be inconsiderable, the expense of maintaining the fire department would be very materially reduced.



WORLD'S FAIR EXHIBIT OF THE PAGE BELTING COMPANY IN MACHINERY HALL.

World's Fair Exhibit of the Page Belting Company.

The Page Belting Company, Concord, N. H., make two distinct exhibits at the World's Fair, besides numerous "live" exhibits in the form of belting operating other exhibits. Among these are the six-foot belts driving the two Westinghouse 10,000 light alternators operated by the 2,000 horse-power Allis engine. These belts are 148¼ and 184¼ feet long, respectively. Page belting is also used in operating the moving exhibits of the General Electric Company.

The exhibit of the Page Belting Company in Machinery Hall includes a handsome pavilion, 20 by 20 feet, containing specimens of the company's products arranged in an attractive manner. This exhibit is the subject of the illustration on this page. Here is shown, in motion, what is said to be the largest belt in the world. It is a three-ply belt, 203 feet long, 102 inches wide, weighing 5,176½ pounds, in whose manufacture were employed 559 hides, taken from the largest steers obtainable. The pavilion is handsomely fitted up and fully equipped with electric lights. The immense pair of ox horns which are clearly shown in the illustration were found in the Transvaal, South Africa.

The company's pavilion in Electricity Building is devoted more especially to those of its products used in electrical power transmission. Acme link belts and two Eureka dynamo belts, driving generators for lighting the space, are here exhibited. The space also contains the largest link belt ever made. It is 201½ feet long, 60 inches wide, three-quarter inch thick, contains 412,390 pieces of leather and metal, and weighs 4,249 pounds.

The cornice of this pavilion is supported by columns made of twisted link belts with bases and capitals of leather, showing the various kinds of belting made by the Page Company.

World's Fair Prize Winners' Exposition.

Owing to the determination of the commissioners to close the World's Fair at Chicago on October 31st, and at the solicitation of foreign exhibitors, who propose exhibiting in New York, it has been decided by the management of the World's Fair Prize Winners' Exposition to change the date of holding the exhibition from February and March, as originally intended, opening on or about November 24, 1893, and closing January 15, 1894.

A main trunk telephone line is at present under construction between London and Glasgow, passing through Nottingham, Sheffield and Leeds. As there is already telephone communication between Glasgow and Belfast, and between Belfast and Dublin, when the new line is completed, communication between Dublin and London will be possible.

Electricity of the Sun.

BY G. P. HACHENBERG, M. D., AUSTIN, TEX.

I read with astonishment J. R. Payson's views on the "Source of the Sun's Heat," published in the ELECTRICAL REVIEW of September 16, 1893. If I understand him rightly, he claims that the sun gathers its electrical energy from the earth and other planets. Had he reversed the order we could not object to his views. And his idea that electricity is a generative agent is a novel one, but not tenable. That it can be displaced and accumulated is self-evident; but that it can be generated in its native state is an impossibility. To apply his principle of the electrical relationship of the earth to the sun may be illustrated by the following experiment, that as yet has not been made with success: To heat a stove red hot, place a small cake of ice 20 feet from it, and with patience wait results. As to the electrical energy of heavenly bodies by the laws of gravitation, a certain quotum is assigned to each; and there could be no possible change in the same, not a millionth part of a volt in a million years; unless there should be an increase of their size and gravitation from some cause.

But allow me to burden you with my views on the subject upon which I expended pet reflections years ago.

The sun is an opaque body, pretty much like the earth, and like the earth has a corresponding atmosphere. This atmosphere serves as an electrical storage, and the outer part of it is the luminous aurora, increasing in brilliancy as it recedes from the sun. We have a feeble exhibition of this phenomenon in the aurora borealis of the earth. Without this air there would be no solar light; for electricity must have a vehicle for its transmission and manifestation. To the sun there is neither night nor shade, but a perpetual day and twilight—the light reflecting from the immense aerial space above from all points. No stars nor planets of any kind can be visible to the face of the sun, and from any planet can only its aurora and not the body of the sun be seen. Such is the construction of that body, caused by its immense force of gravitation, that in all probability it has no physical disturbances analogous to earthquakes and volcanoes; and much less is it a planet of fire, with violent perturbations, a thing that could not exist in nature as a perpetual phenomenon. There may be at times violent aerial commotions caused by meteoric clouds of different electrical tension that often by slow process complete their evolutions, and cause the so-called spots and apparent eruptions of the sun. It does not seem to be surprising that these are visible by means of a telescope, when in size they often cover an area many times the whole surface of the earth. These may be regarded as the dormant fields of electricity, the same condition as existing in the cumuli of our clouds, only they are exceedingly deep, dense and sluggish in their movements.

But how does the solar air become luminous, and by what physical process are the rays of light cast into space millions and millions of miles, and how is solar heat produced?

To answer these inquiries we have to examine into the relation electricity has with several other elements in nature. The most important of all is the relation of electricity to gravitation, its fountain source. These two immense forces are inseparable, but antagonistic in action. Gravitation is central and static, with a tendency to force everything to itself. But electricity is the only agent in nature that recedes from its influences, and does so on the most attenuated support that may come in its way, as in evaporation and reflected heat. It is fugative, diffusive, and capriciously passes from body to body as if to seek an equilibrium of its forces, still never to find it. It is carried along in currents and in molecules in the process of evaporation. Electricity is the essence, the ether of gravitation; in other words the principle of gravitation, as saccharin is that of sugar, or acid that of vinegar.

It is a fixed fact that as a body increases in size there is a corresponding increase of gravitation and electrical manifestation with it, depending on the media of its conduction. As light is one of the effects of electricity, we can readily comprehend why a body, large, like the sun, yields a ceaseless electrical light of the greatest magnitude and intensity.

The electricity of the sun as an invincible agent is taken into the solar air by the same physical law that terrestrial electricity finds its way into the clouds.

No doubt the physical properties of solar air are such that a prompt phosphorescence is induced through an electrical storage. A condensation of the air by an immense force of gravitation alone would favor this. This illumination is effected in its highest degree many thousand miles from the face of the sun, forming close to the ether ring an incandescency with the brilliancy of lightning itself. In all this there is no ignition, therefore no heat, and no consumption of material. This halo, or photosphere, as it is called, runs into the confines of the ethereal space. The solar electric light coming here in contact with a new relation of things, takes upon itself another physical process. In the first place, strictly speaking, there is no such a thing as a vacuum. You can exclude air from a transparent vessel, but none of the light carriers—Herschel's ether that fills all space of the universe.

What is this mysterious substance that in minuteness goes beyond all human reckoning? We only know it from its effects, and the absolute necessity of having a connective agency with all bodies. Without it, existence and reproduction would be at an end. It is evidently an agent more subtle than light itself, and holds a fixed linual relation with whatever imponderable substance it may carry or come in contact with. It gives form to every "pencil of light," and to those twinkling oscillations of both natural and artificial lights. Their lines may emanate from any given point, and thus cause a diffusion of light. As light carries they perform their function through the interstellar space, away from all atmospheric influences. This is illustrated by passing solar light through a transparent vacuum, and what is pertinent to our subject, light is greatly increased in intensity in it when the vacuum vessel is brought under electrical influences. There is a principle involved in maintaining the intensity of solar light in its transmission. Each line of light in passing from the sun to the earth in a ceaseless flow, increases its incandescence under the focal influences of the ethereal molecules.

This is fully illustrated by looking through a highly polished tube at any bright light. The light in the shadows is but a faint reflection from those direct solar rays. It must be remembered that no degree of atmospheric disturbances in day time will ever materially interfere with the lineal relations of these molecules.

Solar light passes through three distinct dynamic processes in its transmission:

1. An electric force at the photophere.

2. A motion when once enforced will remain continuous throughout the ethereal space, of its own system, not meeting with any resistance.

3. The rays in penetrating the atmosphere of a distant planet on the laws of resistance, will generate heat according to its relative position with the sun, and modified by local influences.

Light and electricity may form a compound (as oxygen and nitrogen to form atmospheric air) producing ultimate effects; but it is more probable that the conduction of light in ether is by affinity with electricity, propelled in a manner sound is transmitted in the telephone. But even as a compound it would follow a common law of chemical equivalents, readily dissolved by its feeble synthesis.

Electricity performs another and more important office than to convey light and heat to the planets: for after this office has been performed it became the force to guide them in the course of their orbs. If we could estimate this force on heavenly bodies, the greatest marvel would be to find comparatively how small a force is required for this purpose. This is owing as no gravitation force is in the way of resistance. It is not a great stretch of the fancy to say that the earth flies the path of its orb light as a feather.

Light is an emanation from electricity, as electricity is from gravitation. It is a modified electricity at the expense of its velocity. The velocity of light is assumed at 192,000 miles per second; that of electricity at 288,000 miles per second. If it were possible to disengage the two, electricity would have a greater velocity, and the action of light would fall short in speed and distance, and lose all vivifying properties to animal and vegetable life.

What is the ultimate fate of a pencil of light? There are two influences that bring it to a terminus. First, when the supply is cut off, and in the second place, after being carried a certain distance, depending on the potentiality of its source, it is either changed into its original condition, or expended on foreign bodies. To maintain the production of worlds and the universal illumination of the universe at large, there is need of a multiplicity of solar systems. Light is not only essential for optical conveniences, but is the principal factor in the construction and growth of all things. In organic matters its effects are quick and decided; in the formation of a world it may take a million of years.

The resolution of solar life, not only of our solar system, but of many others, may, in a great measure, take place in the confines of an immense orb, there mapped to us as the milky way. What is this milky way? It is the twilight of the worlds, and the rays of light from innumerable worlds, faintly penetrating it, and is not a part of the great galaxy, as is usually supposed, but they are brought in exhibition as the stars are made visible to us in the night. The milky way is the great field where the consumption of solar lights of many suns take place. It is a gloomy belt through which we see millions of worlds. It is here that the nebulæ and nucleate of worlds are formed, under the combined action of ether, light and electricity. It cannot be otherwise, as these are the only agents that can reach the place. Nebulæ in the great orb of the milky way in course of long ages coalesce and consolidate, and finally become planetary bodies, and in process of their growth find their locality in the great galaxy of the heavens.

What we know as meteorolites, the earth gathers by the force of its gravitation, come not from immediate planets, as is usually supposed, but are the stray bodies from the milky way. These, with their quotum of electricity, keep clear from each other, as dust in a pencil of light in a dark room is seen, until they come within the range of some planet (comets in particular) that receives them by attraction and puts a stop forever to their independent flight. Their heat and illumination are of short duration, and are developed in their rapid passage through atmospheric air—much on the same principle solar heat is created.

What is the history of a newly formed planet? Its relation to other bodies at first gives it the character of a comet, and as such continues its straightforward course until its line of parabola is formed by the attraction of some great body. Comets are not of perpetual duration, for sooner or later they become members of some solar system. Some may play around a sun at stated times for many thousand years, but when once fully formed they are assigned to their legitimate sphere, on an electrical principle of attraction and repulsion. The idea that the formation of worlds proceeds direct from the sun is as unreasonable as to suppose it was a great furnace of fire that give heat and light. It might have taken a million of years, and the aid of as many suns to form the earth, but leaving it only to one to finish its beauty and perfection. All heavenly bodies, like the earth, under the influence of solar electro light, grow in size. Consider the earth syllogistically with its growth (mother of) vitality, motion, sweat (dew), eruptions (volcanoes), borborymi (earthquakes), skin and hair (alluvial soil, grass and trees), effluvia, and with its parasites—big and small, living on each other—what a strange monster we make out of it; and what insignificant subjects we make out of ourselves.

The extraordinary velocity of comets through the milky way has much to do to draw material together and put bodies in motion. This is accomplished through a gravitation traction under the highest possible speed of a planet.

The question may present itself: Does the sun produce vegetation and animal life? Such a thing was considered impossible, owing to the overwhelming force of gravitation alone.

Hershel, on this subject, says: "An ordinary man would not only be unable to sustain his own weight at the sun, but would be literally crushed to atoms under the load." The immense force of gravitation of the sun must be admitted, but at the same time it is resisted on the suaface by a corresponding centrifugal force that may render it fully as inhabitable for animal and vegetable life as the earth. Could the centrifugal force of the earth cease, to say nothing of its relation to the sun, not only would animal and vegetable life be destroyed at once, but the mountains would roll into each other and be engulfed in the waves of the ocean.

When the time comes for the destruction of the earth, or rather for its evolution into a larger and better world, it will take but very little to bring it about, in particular in its first stages. The least change in its natural forces will open its bowels of fire, and for a time a hell will reign supreme. The visitation of a comet on its independent course, with barely a touch, may cause the disarrangement, and on its return from the sun, finding the electrical condition of the earth so vastly changed by ignition, even if in the line of its former proximity to the earth, a sudden coalition is effected. The force of gravitation at once would form the mass into a globe. The earth, like a bride, is taken from its home and carried through space inconceivable, now and then gathering up other worlds, until the bulk of a sun is formed. At its final destination it becomes the center of a solar system; in course of the ages of the heavens planets are assigned to it by those busy world builders that at times pass our vision never to be seen again. Whose heavenly home will this improved and enlarged earth be, that then reigns with the dignity of a sun? Thus will the earth be purified and the faithful purified with it.

A Powerful Electric Elevator.

The new Frisbie electric elevator in the car house of the Consolidated Street Railway Company, at Worcester, Mass., was successfully tested last week. The trial test consisted of raising one of the heavy cars to the upper floor. The elevator is said to be the largest electric elevator ever built in the United States. It consists of a platform 34 feet long, 15 feet high and 10 feet wide, weighing 6¼ tons. This is guided at four points, and suspended in the center by wire ropes, any one of which is capable of lifting a maximum weight of nine tons without danger of breaking. The steel beams which carry the sheave wheels, over which these ropes pass, weigh, with their supporting columns, more than four tons. The motive power for this elevator is supplied by a 20 horse-power Westinghouse motor. This motor derives its power from the trolley circuit. The railway company will use this for lifting their cars from the ground floor to the second story of their building whenever storage or repairs are desirable.

Business.

(From the Indianapolis Journal.)

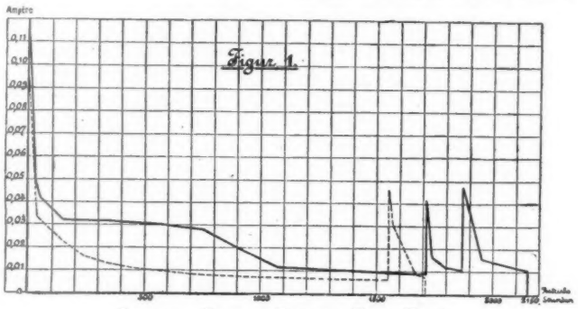
"Vot's Chonson's number?" asked Mr. Einstein.

"Ten-fifty," answered the angel who presides over the telephone exchange, "but you'll have to wait."

"Oh, vell, if I can't get den-fifty, I take den twenty-five," answered Mr. Einstein before he thought.

Gassner Cells Recommended for Supplying Current to Transmitters.

This is not the first time that Gassner's well-known dry battery has been recommended by European electricians on account of its superiority over voltaic batteries, employing a fluid exciter. Quite recently, Mr. Carl Gigot, of Frankfort-on-the-Main, has made a series of exhaustive tests with



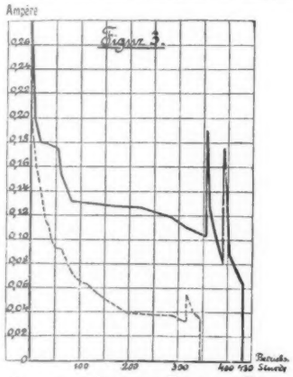
CURVE OF GASSNER BATTERY TEST, No. 1.

the Gassner cell, and has published his results in the *Archiv für Post und Telegraphie*.

As this subject may well claim the attention of a good many of the readers of the ELECTRICAL REVIEW, we publish a translation of the important portion of the above-mentioned article.

The experiments and tests were made in the laboratory attached to the Berlin main telegraph office. In every test two of six cells, each having 1.47 electromotive force and 0.2 internal resistance, were short circuited or closed through an equal amount of resistance.

The first two cells remained continuously

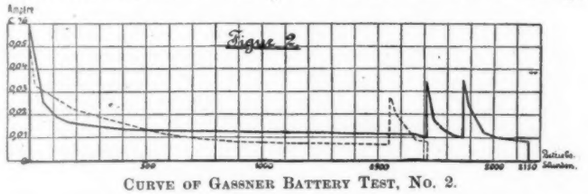


CURVE OF GASSNER BATTERY TEST, No. 3.

closed through 12½ ohms, the second ones through 25 ohms, while every quarter of an hour the circuit of the two cells, constituting the third group, remained closed for three minutes through five resistance. It was assumed that this length of time represented the daily use of a cell in practical telephone service.

It will be seen that the output of the cells of the third group, after 24 hours' work, equalled that of the cells of the second group, while the cells of the first group did twice as much work as any of the others.

Former experiments have shown that the electromotive force of a transmitter battery



CURVE OF GASSNER BATTERY TEST, No. 2.

may drop to 0.21 volts without decreasing the quality and loudness of transmission below that which is produced by a magneto transmitter in a magneto receiver. Including, however, into the transmitter circuit the cells of group 1, the transmission was still considerably superior to that of a magneto transmitter. As a rule it seemed best to discontinue the tests whenever the electromotive force of a cell had not only dropped to 0.15 or 0.30 volts, but after a few days of rest would at once drop to such a low voltage.

To compare the working capacity of a Gassner with a zinc carbon element a number of them were chosen and subjected to exactly equal tests. In the drawings the heavy black line shows the action of the Gassner cells, and the dotted line that of the zinc-carbon elements. As usual, the abscissæ represents the actual time during which the batteries furnished current; each square of the drawing is the equivalent of an ampere hour, so that the drawing shows at once the quantity of electricity contained in each cell. The interruptions or discontinuations of the test are apparent from the sudden rising of the curves. The following results were obtained:

TEST No. 1.

The batteries being closed through 12.5 watts, the two Gassner cells furnished an average of 45.9 amperes, while the two zinc carbon elements produced but 18.9 ampere hours through an equal resistance. After 2,150 hours of continued work the electromotive force of the Gassner cells fell from 1.47 to 0.12 volts; that of the zinc carbon battery, after 1,710 hours, dropped from 1.28 to 0.1 volts. Again, while the internal resistance of the Gassner cells at the close of the test still registered 0.45 volts, that of the zinc carbon battery had gone up to 1.7.

TEST No. 2.

The cells were closed constantly through 25 watts (see Fig. 2). In this test the average working efficiency was 30.7 ampere hours. During the test the electromotive force of the dry battery fell from 1.47 to 0.15 volts, and its interior resistance rose from 0.2 to 0.7. On the other hand, the zinc carbon element at the time its electromotive force had dropped to 0.15volts, furnished but 20.8 ampere hours, and at the close of the tests its internal resistance amounted to 1.3 watts.

TEST No. 3.

The largest supply of energy was derived from the two cells which were closed every quarter of an hour through a resistance of 5 watts. As shown in Fig. 3, they averaged 51.3 ampere hours. It should be noted that the zinc carbon element, working under identical conditions, produced but 21.7 ampere hours. Again, while at the close of the test the electromotive force of the Gassner cells was 0.30 volts, the voltage of the liquid batteries had dropped to 0.2 volts. The same difference in favor of the Gassner cell is shown by a comparison between the internal resistance of the respective batteries. At the end of the trial, the Gassner had 0.5 watt, the zinc carbon combination 0.86 watt.

From the above stated tests, it is at once apparent that the dry battery produces a much larger quantity of electricity than the zinc carbon element; but the greatest importance is attached to the tests in which the experimenters placed the cells in a condition corresponding closely to the use of a transmitter battery in a busy exchange, and the results of test No. 3 should be carefully noted by all telephone and telegraph electricians. It is but right to mention that practical experience with Gassner cells fully corroborates the tests made by the technical staff of the German Telegraph Administration.

RANALD T. McDONALD.

THE EMINENT ELECTRICAL MANUFACTURER INTERVIEWED ON THE FLY—BUSINESS OUTLOOK IMPROVING—FORT WAYNE ELECTRIC DOING A GOOD BUSINESS—PLEASANT RELATIONS WITH GENERAL ELECTRIC, BUT INDEPENDENT—MR. COFFIN A VALUABLE MAN, AND NO DOUBT WILL REMAIN PRESIDENT.

A representative of the ELECTRICAL REVIEW ran across Mr. R. T. McDonald, the head and front of the Fort Wayne Electric Company, in the elevator at 44 Broad street, one day last week, chased him into his private office and realized on 7½ minutes of his valuable time and active mentality with assets about as below given:

There have been many rumors relating to the relations of the General Electric Company and the Fort Wayne Electric Company. Some of these were to the effect that it was the intention of Mr. Coffin to retire from the presidency of the General Electric Company and accept the presidency of the Brush Electric Company, of Cleveland, or the West End Street Railway Company, of Boston, and Mr. R. T. McDonald was talked of as his probable successor.

Like the Ancient Mariner, or was it somebody else, the REVIEWITE transfixed Mr. McDonald with his glittering eye, and an animated dialogue occurred.

MR. RANALD T. MCDONALD, FORT WAYNE ELECTRIC COMPANY.

"Is there anything new or startling in the electrical field?" was asked.

"Matters are about as they have been," Mr. McDonald replied. "The Fort Wayne Company is quite busy and we are looking after its interests in every way we can."

"Has there been any special disruption of the relations between your company and the General Electric Company?"

"Our relations are the same to-day as they have been for the past year or two," said Mr. McDonald. "The General Electric Company never owned a controlling interest in the company, and we have always been independent in this respect."

"Is there anything in the rumor about your becoming more actively identified with the General Electric Company?"

"There is not. I do not think it is likely any place would be offered me, and if it were I could not accept. You know," and Mr. McDonald's eyes twinkled, "that in addition to looking after the affairs of the Fort Wayne Electric Company I have a farm out in Indiana that requires a good deal of attention. My personal relations with Mr. C. A. Coffin are the most pleasant, and I do not think there is any intention or desire to have him leave the General Electric Company. He is too valuable a man. I am not acquainted with the people interested in General Electric other than Mr. Coffin, and do not pretend to speak with any authority of that company's affairs."

"Mr. McDonald, you have large electrical interests in all parts of the country, and as you have been quite an extensive traveler in the past few weeks I would like your opinion for the readers of the REVIEW as to the business outlook."

"I think it is improving and is now encouraging. Of course, if Congress should not pass the Repeal Bill it will be an unfortunate thing, but I have confidence that this will be done and business generally will gradually but steadily improve. We have noticed considerable improvement in our own business during the past few weeks."

"You are a stockholder, I believe, in the Madison Square Bank, and a good many of your friends trust that you have not been a heavy loser by its failure."

"The stockholders will lose some money there of course, but I am pleased to say all the depositors will be paid in full, and if any of your friends had bank accounts there they will get all their money in due time," was the reply.

During this brief conversation Mr. McDonald had sent off six telegrams and answered nine calls on the telephone, and a line of visitors had formed in the outer office, and the REVIEWITE was beginning to think that perhaps it was time for him to go.

"Don't be in a hurry, this is not my busy day," was the remark as the newspaper man started to go. "I hope the newspaper business is good and if you will come and see me at my farm in Indiana, I think I can prove to you that I am something of a farmer, and know a little about looking after other kinds of plants except electric power and electric lighting plants. I shall be in the city about a week or so, and if anything of a startling nature occurs I shall be pleased to supply you with any information in my power just as liberally as I have to-day."

The newspaper man departed, and in looking over the interview above he is not sure whether he received a great deal of information or not. Anyhow he enjoyed a pleasant quarter of an hour with one of the most forceful, successful and genial men in the electrical business, and the readers of the REVIEW are welcome to all the information herewith given.

ELECTRIC LIGHT FLASHES.

The electric light question is being discussed at Fayette, Ia.

There is some talk of putting in an electric light plant at Fox Lake, Wis.

The contract for building the new electric light station in North Attleboro, Mass., has been awarded to W. O'Connell, of Canton. Work will begin at once, and the building will be completed this fall. It will cost about $12,000.

An advance made in lighting rates for arc lights by the Mahoning, O., Electric Light Company, has aroused a storm of indignation among the users of the light, and it may result in the merchants of the city forming a company and erecting an electric light plant.

The directors of the Monongahela Electric Light Company, of Homestead, Pa., last week, decided to levy an assessment of $11,000 on the stockholders. This will put the company in good shape financially. The assessment will be paid in four installments between October and March.

Mr. E. G. Burklin, owner of the Biloxi, Miss., Electric Light Company, reports that his company is doing a good business. The plant consists of a 150 horse-power Corliss engine, and a 1,500 light alternating incandescent La Roche system, running at 2,000 volts, and using Stanley transformers. Mr. C. Benjamin Bolton is electrician of the plant.

The Co-operative Electric Light Company, of Chicago, Ill., announces that it will be ready to supply incandescent lights on the north side about Oct. 15. The company is now laying about 20 miles of cable conduits in the district between the river and North avenue, and has already spent $200,000 in its new plant between Eden and Cedar streets on North State street.

World's Fair Awards.

HONORS CONFERRED BY THE JUDGES IN THE DEPARTMENT OF ELECTRICITY.

The judges in the Department of Electricity at the World's Fair have made awards to the following companies and individuals. The awards consist of bronze medals and diplomas describing the merits of the articles honored. The awards for storage batteries, incandescent lamps and insulated wires for electric lighting have not yet been announced, as the tests in these branches have not been completed.

UNITED STATES.

Albert & J. M. Anderson, Boston, Mass.—1. Trolleys. 2. Railway insulators.

Brush Electric Co., Cleveland, O.—1. Direct current dynamos for series arc lighting. 2. Direct current dynamos for series arc lighting coupled to engine, 125–2,000 candle-power lamps. 3. Alternating current dynamos constant potential, 36–150 kilowatts. 4. Arc circuit switchboard. 5. Direct current dynamos constant potential, 20–100 kilowatts. 6. Arc lamps, all types.

Bryant Electric Co., Bridgeport, Conn.—Snap switches.

W. R. Brixey, New York.—Underground, aerial and submarine telegraph and telephone cables.

J. H. Bunnell & Co., New York.—1. Standard dry batteries. 2. Telegraphic apparatus.

"C. C." Electric Motor Co., New York.—1. Direct current motors, constant potential, 3–50 horse-power. 2. Electric motor, fan and blower combination.

Cutter Manufacturing Co.—Philadelphia, Pa.—Push switches for electric lights.

Commercial Cable Co., New York.—1. Ocean telegraphic apparatus operating through Muirhead's artificial resistances. 2. Cuttris's improved cable telegraph apparatus.

Crane Electric Co., Chicago, Ill.—Electric passenger elevator complete.

Carpenter Enamel Rheostat Co., Bridgeport, Conn.—Rheostats.

Copenhagen Fire Alarm Co., Chicago.—Automatic fire alarm.

George Cutter, Chicago.—Lamp supporting pulley.

Electrical Forging Co., Boston.—Electric heating and welding apparatus.

Electric Heat Alarm Co., Boston.—Thermostat for automatic fire, hot journal and hot grain alarms.

Electrical Conduit Co., New York.—Underground conduit for electrical wires.

Electric Launch and Navigation Co., New York.—Electric launches.

Eddy Electric Manufacturing Co., Windsor, Conn.—Direct current motors, constant potential.

Excelsior Electric Co., New York.—1. Arc lamps series circuits. 2. Direct current dynamos for series arc lighting.

Elektron Manufacturing Co., Springfield, Mass.—1. Direct current motors, constant potential multipolar, slow speed. 2. Automatic motor starter.

Electric Selector and Signal Co., New York.—Electrical system for locking and unlocking.

Edison Manufacturing Co., New York.—Edison-LeLande primary battery.

Eureka Tempered Copper Co., North East, Pa.—Tempered copper for use in electrical construction.

Fort Wayne Electric Co., Fort Wayne, Ind.—1. Direct current "Wood" dynamo for series arc lighting. 2. Alternating current "Wood" dynamo, constant potential compound wound, 150 kilowatts. 3. Arc lamps for constant current.

I. P. Fink, New York.—Screen reflectors for incandescent lamps.

General Electric Co., New York.—1. Electric locomotives for factory and switches service. 2. Electric elevated system. 3. Long distance power transmission, plant in operation, tri-phase. 4. Arc lamps for direct current series circuits. 5. Search-lights and focusing lamps. 6. Transformers, 250–125,000 watts. 7. Engine dynamos. 8. Automatic overload switch. 9. Electrically illuminated fountains. 10. Thomson eccentric coil-ammeters and voltmeters for alternating currents. 11. Pumping machinery driven by electric motors. 12. Electrically driven rock working machinery. 13. Mine locomotive. 14. Haskins' astatic ammeter. 15. Arc lamps for constant potential circuits, direct and alternating (Knowles). 16. Jaw switches, fuses, sockets and branch blocks. 17. Direct current dynamos for series arc lighting. 18. Alternating current dynamos, constant potential, 30–300 kilowatts. 19. System of street railway service. 20. Direct current dynamos, constant potential (direct connected excepted), and direct current shunt wound motors, constant potential. 21. Edison feeder system for distribution of electricity. 22. Slate switch-board for arc light circuits. 23. Ventilating set, portable, government standard. 24. Historical apparatus. 25. Edison three wire system for distribution of electrical energy. 26. Exhibit of incandescent lamps, all styles, ½ to 250 candle-power. 27. Underground system complete in all details. 28. Hoisting apparatus driven by electric motors. 29. Integrating wattmeter.

The E. S. Greeley & Co., New York.—1. Testing instruments. 2. Exeter dry battery. 3. Telegraph apparatus.

Gamewell Fire Alarm Telegraph Co., New York.—Automatic fire alarm telegraph system.

General Incandescent Arc Lamp Co., New York.—Arc lamps for constant potential circuits.

Hart & Hageman Manufacturing Co., Hartford, Conn.—Snap switches.

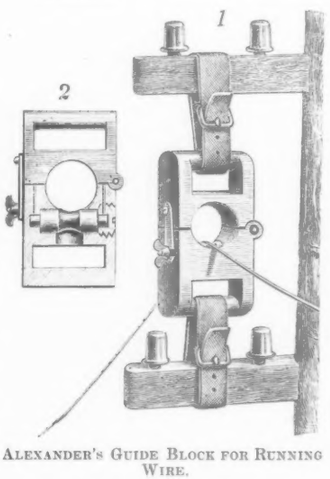
Helios Electric Co.—Arc lamp for alternating current.

The Hanson Battery Co., Washington, D. C.—Primary batteries.

Interior Conduit and Insulation Co., New York.—1. System of interior insulating conduits. 2. Snap switches.

Jenney Electric Motor Co., Indianapolis, Ind.—Direct current dynamos and motors, constant potential.

H. W. Johns Manufacturing Co., New York.—Vulcabeston and molded mica insulating material worked into all kinds of insulations.



ALEXANDER'S GUIDE BLOCK FOR RUNNING WIRE.

Leclanche Battery Co., New York.—Leclanche batteries, especially the "Vole" and "Cylinder" cells.

Mather Electric Co., Manchester, Conn.—Direct current dynamo, constant potential, 500 volts.

McIntosh Battery and Optical Co., Chicago, Ill.—Electro-medical, dental and surgical apparatus.

National Carbon Co., Cleveland, O.—Carbons for arc lamps.

Nutting Electric Co., Chicago, Ill.—Nutting arc lamp.

Otis Bros., New York.—1. Electric pump. 2. Electric motor and controlling devices for elevator and hoisting service.

H. T. Paiste, Philadelphia, Pa.—Snap switches.

Police & Signal Co., Chicago.—System of police patrol telegraph.

Phœnix Glass Co., Pittsburgh, Pa.—Electric and gas globes and shade cut, etched and colored.

Queen & Co., Philadelphia, Pa.—1. Electrometer (Ryan). 2. Galvanometers. 3. Testing sets and resistances. 4. Portable medical induction apparatus for physicians' use. 5. Commercial ammeters and voltmeters.

J. A. Roebling's Sons Co., Trenton, N. J.—Bare copper and trolley wire.

F. A. Ringler & Co., New York—Half tone photo-electrotype, steel faced.

Standard Electric Co., Chicago—1. Arc lamps for direct current series circuits. 2. Direct current dynamos for series arc lighting.

Stevenson Hoggson Electric Co., St. Louis, Mo.—Automatic electric time stamp.

Sperry Electric Railway Co., Cleveland, O.—Electric railway system.

Short Electric Railway Co., Cleveland, O.—Short electric railway system.

Self-Winding Clock Co., New York.—Special application of an iron-clad solonorid magnet.

Thomson Electric Welding Co., Boston.—Apparatus for electric welding and forging.

Union Electric Works, Chicago.—Primary battery.

J. C. Vetter & Co., New York.—1. Incandescent current adapter. 2. Dry Leclanche battery.

Western Electric Co., Chicago.—1. Columbian lamp post. 2. Telegraph apparatus. 3. Telephone cables, Paterson. 4. Annunciators and signaling apparatus. 5. Multiple switchboard for telephone service. 6. Direct current dynamos for series arc lighting. 7. Application of electric lights for the production of scenic effects in theaters and for the decorations of rooms, etc. 8. Arc lamps, various styles, for series circuits. 9. Arc lamps for constant potential circuits. 10. Direct current dynamos and motors, constant potential.

Waite & Bartlett Manufacturing Co., New York.—1. Holtz induction machines in air-tight case, with six 40-inch revolving plates. 2. Special faradic apparatus for varying the tension and strength of current (Engleman's apparatus).

Washington Carbon Co., Pittsburgh, Pa.—Carbons for arc lamps, batteries and dynamos and motor brushes.

Wm. Wallace, Ansonia, Conn.—Historical electric light exhibit.

Walworth Manufacturing Co.—Poles for trolleys and arc lamps.

S. S. White Dental Manufacturing Co., Philadelphia, Pa.—Acid gravity batteries, "Partz."

Westinghouse Electric and Manufacturing Co., Pittsburgh, Pa.—1. Engine dynamos. 2. Transformers, 250-12,500 K. W. 3. Direct current dynamos and motors, constant potential bipoler and multipoler (except direct connected dynamos). 4. Alternating current dynamos, constant potential, 750 K. W. 5. Electric street railway system. 6. Alternating current dynamos for series arc lighting. 7. Long distance power transmission, plant in operation. 8. Two-phase alternating current motors (Tesla). 9. Incandescent system of street lighting. 10. Switches. 11. Complete switchboard for controlling 17 dynamos and 40 currents. 12. Lightning arresters.

Weston Electrical Instrument Co., Newark, N. J.—1. Alternating current instrument, including wattmeters. 2. Standard resistances and bridges. 3. Electrical measuring instruments for physicians' use. 4. Switchboard instruments. 5. Direct current ammeters and voltmeters, standard and portable.

Western Union Telegraph Co., New York.—Instruments used in quadruplex telegraph, latest design.

Zucker & Leavett Chemical Co., New York.—Collection of chemicals and appliances for electro-plating.

GERMANY.

Prof. Aron, Berlin.—Electric meters.

J. Berliner, Hanover. — Universal transmitter, long distance.

Geo. Caretto & Co., Nuremburg.—Optical, physical and mechanical instruments and toys.

Dr. Edelmann, Munich.—Electro-medical apparatus.

Felton & Guilleaume, Muhlhausen on Rhine.—1. Electric cables with special armor. 2. Electric cables.

Cornelzen, Nuremburg. — Carbons for arc lights.

Hartmann & Braun, Frankfort—1. Differential arc lamps. 2. Galvanometers. 3. Electrical measuring instruments, including instruments of precision. 4. Photo-meter, large universal. 5. Apparatus for testing iron and steel with respect to magnetic permeability. 6. Reading telescopes, mirrors and scales. 7. Portable measuring apparatus used in laying cables.

W. A. Kirshman, Berlin—Electro-medical apparatus.

Imperial German Postal Telegraph Department, Berlin—1. Maps and drawings showing system of government telegraph lines using armored underground cables. 2. Telegraphic apparatus of the German telegraph service. 3. Historical telegraphic apparatus.

Korting & Matthissen, Leipsic.—Arc lamps for constant potential circuits.

H. Schomburg & Sons, Berlin.—1. Insulators and insulating material. 2. Dry batteries.

Schuckert & Co., Nuremburg.—1. Search-lights with parabolic glass mirrors. 2. Annunciators for vessels. 3. Arc lamps for constant potential circuits.

Siemens & Halske, Berlin.—1. Arc lamps for constant potential circuits. 2. Direct current dynamos, constant potential 750 kilowatts. 3. Historical apparatus.

Schmidt & Haenck, Berlin.—Lamner-Brodham photometer, with accessories.

J. Zacharias, Berlin.—Dry batteries.

TURKEY.

Imperial Ottoman Government.—Telegraphic apparatus.

GREAT BRITAIN.

British Government Postal Telegraphic Department.—1. Modern telegraphic apparatus in operation. 2. Historical telegraph apparatus.

Corporation of Birmingham.—Original Woolwich dynamo.

General Electric Co., Limited., London.—H. I. switches and other incandescent house fittings.

James White, Glasgow.—Electro-magnetic balances (Kelvin).

AUSTRIA.

F. Hardtmuth & Co., Vienna.—Carbons for arc lamps, etc.

RUSSIA.

Imperial Russian State Paper Manufactory, St. Petersburg.—Collection of electrotypes.

Imperial Artillery Arsenal, St. Petersburg.—Electrical registering attachment for testing machine (Prince Cagarian).

ITALY.

Prof. Calcleo Ferraris, Turin.—Historical alternating current motors.

JAPAN.

Imperial University, Tokio.—1. Scismographs and accessory apparatus. 2. Model of an earthquake.

Department of Engineering, Imperial University, Tokio.—Automatic electric current recorder.

BRAZIL.

Directoria Geral dos Telegraphos, Rio de Janeiro.—Telegraphic apparatus.

A Guide Block for Running Wires.

Where wires are to be run or stretched from pole to pole, as in putting up telegraph, telephone, and other wires, the device shown in the illustration is designed to greatly facilitate the work. The improvement has been patented by Mr. Ulysses H. Alexander, No. 1008 Delaware avenue, Wilmington, Del. It consists of a block adapted to be conveniently connected with the cross-arms of a pole, as shown in Fig. 1, the block consisting of two hinged sections, each having on its inner face recesses which constitute a circular opening when the sections are closed. In the lower wall of the central opening, as shown in the sectional view, Fig. 2, is a cut-away portion adapted to receive a roller, and side recesses, one of which receives one of the trunnions of the roller, while in the other is fitted a screw plug affording a bearing for the other trunnion. The central portion of the roller is concaved, to better guide the wire passed over it, and the roller may be readily changed by removing the plug. For lubricating purposes, oil ducts lead from the upper surface of the lower block section to each of the trunnions. The two sections of the block are preferably locked in closed position by means of a hook and wing nut screwing on a threaded stud, the sections being thus readily opened out for the introduction of the wire or its removal from the central opening.

The Edison Current for Cautery Purposes.

Dr. Edward J. Bermingham, surgeon to the New York Throat and Nose Infirmary, describes a very ingenious apparatus which he has devised for cotrolling the Edison current so that it can be used direct for galvano cautery operations. The apparatus consists of a rheostat, made of coils of iron wire and a handle. The peculiarity of the handle consists of its having solid conductors, and the circuit is, therefore, always closed. It is under the control of the operator's thumb at all times during the operation, and the current can be cut off from, or allowed to pass to, the knife instantaneously and without producing an arc. The apparatus is simple and inexpensive, and, from the detailed description given, any electrician can construct it. Dr. Bermingham has been using it for two years and a half for all his cautery operations.—*New York Medical Journal.*

Receiver for Alexander, Barney & Chapin.

The execution for $16,549, which was recently obtained by Patrick Gray against Alexander, Barney & Chapin, dealers in electrical supplies at 20 Cortlandt street, New York, has been set aside, and Judge Ingraham has appointed as receiver Samuel W. Milbank, of 11 Pine street, New York. Mr. Milbank has qualified in a $20,000 bond. The store at 20 Cortlandt street, which has been closed for nearly two weeks past, will be vacated, and the stock moved to other and less expensive quarters.

The Allis World's Fair Engine.

The illustration on this page shows an interior view of the North Reliance erecting shop of the Edward P. Allis Company, at Milwaukee, Wis. In the foreground is shown the valve gear side of the low pressure cylinder of the World's Fair quadruple engine, showing also the method of adjusting and arranging the valves. This engine was designed by Edwin Reynolds and built by the Edward P. Allis Company. It is a quadruple expansion condensing engine, with a rated capacity of 2,000 to 2,500 horse-power, when working under such conditions as to develop the best economy in steam consumption. Its maximum capacity is from 3,000 to 4,000 horse-power.

Steam passes successively through four cylinders, doing a part of the total work in each, and then to the condenser. The first, or high-pressure cylinder, is 26-inch diameter; the second, or first intermediate, is 40-inch diameter; the third, or second intermediate, is 60-inch diameter; and the fourth, or low-pressure cylinder, is 70-inch diameter; the stroke is 72 inches; the revolutions, 60 per minute. The balance wheel, which is shown in the upper part of the illustration, is 30 feet diameter, by 76-inch face, and weighs 150,000 pounds. The total weight of the engine is 315 tons. The condenser is Reynolds Patent, with air pump 36-inch diameter by 16-inch stroke, driven by a 16x36 steam cylinder. This engine is twice as large as the next largest engine exhibited, and more than twice as powerful as the famous Centennial Corliss Engine. It drives, by means of two belts, two large Westinghouse generators, which are intended to supply electric current for 30,000 sixteen candle-power incandescent lamps. It is the representative engine of the Exposition and a notable example of the highest type of steam engine yet produced.

Mounted on the bed plate near the main shaft is a small model engine, with cylinder 2x4 inches, complete in all its parts and an exact copy of the standard girder frame engines built by this company. In the main body of the picture is shown the high and low-pressure side of this same engine, with various other cylinders in course of construction. This erecting floor is of 50 feet span and has traveling over its length a 30-ton traveling crane.

Improving the Chicago Telephone Service.

Considerable satisfaction has recently been expressed in Chicago over the great improvement noticed in the telephone service. Mr. A. S. Hibbard, general manager of the Chicago Telephone Company, told a reporter the other day that the improvement was largely owing to the fact that a general examination and complete overhauling of wires and fixtures was in progress, and that many new devices and improvements have been introduced. "The Chicago Telephone Company," said General Manager Hibbard, "has adopted every modern improvement known, and now makes claim to having the most complete, as well as the busiest, telephone exchange in the world. Chicago has 10,400 telephones, operated in 11 exchanges. The number of "talks" really represents the business of the exchange, and they number over 145,000 a day. To accommodate this vast business the telephone company has put down 48 miles of underground conduit, containing 18,000 miles of wire. In the busy down-town districts there were so many wires in demand that the old poles were overloaded, and in deference to the wishes of the city council the wires have been put underground as fast as possible. By the ordinance passed four or five years ago the rate at which the company was obliged to put in conduits was two miles a year, but after the first experimental difficulties were overcome the company steadily exceeded the requirements, until now they have one of the largest underground plants in the world.

"One of the greatest difficulties met with has been the great number of business telephones which are used so many times in a day that they seem to be continually busy, the *Times* office telephone, for instance, exceeding 200 calls per day.

"Down-town places are used principally in the busy hours of the morning and afternoon, and especially Saturday mornings, owing to the prevailing Saturday half-holiday. These busy telephones are what aggravate the ordinary users, who, when they call up a number and don't get it at once, are absolutely certain that the operator at central is careless or indifferent and not attending to business. But so perfect is the system at headquarters that the operator can tell instantly if a wire is in use, and it is much easier for the operator to answer a call instantly and put the inquirer in communication with the number they want than it is to hesitate or delay. To obviate any delays many business men are putting in the latest improved long distance 'phones right on their desks and extra ones for the use of clerks and salesmen.

"The telephone company employs about 1,200 people at present, of which 500 are the girl operators who answer the calls. They are divided into day, evening and night forces, and so perfect is this system that not a moment of time is lost. Each operator answers about 600 calls in a day. Few people appreciate what an intricate system of wires and apparatus is necessary to provide for telephone service. In the main office alone there are 30 sections of multiple switchboards, containing 152,000 spring jacks or points at which connections are made. To each of these four wires are attached, two leading in and two out, so that there are more than 600,000 wire terminals within this board. The World's Fair and long distance wires are provided with glow lamp signals, which also display numbers, and thus facilitate and expedite business. The number of lines extending from one exchange to another have been largely increased, so that now there are 1,100 trunk lines, over 1,000 of which are metallic circuits, by means of which the best telephonic results are obtained. This improvement involves the use of two wires instead of one, and the latest form of long distance 'phones. There are now nearly 300 points reached by the long distance and other toll lines, so that the Chicago subscriber is in direct communication with over 50,000 subscribers in other cities.

"Chicago having gone ahead of every other city in size of plant and character of service," said General Manager Hibbard, "will continue to lead and provide for the growing wants of telephone subscribers a quick, reliable and efficient means of communication."

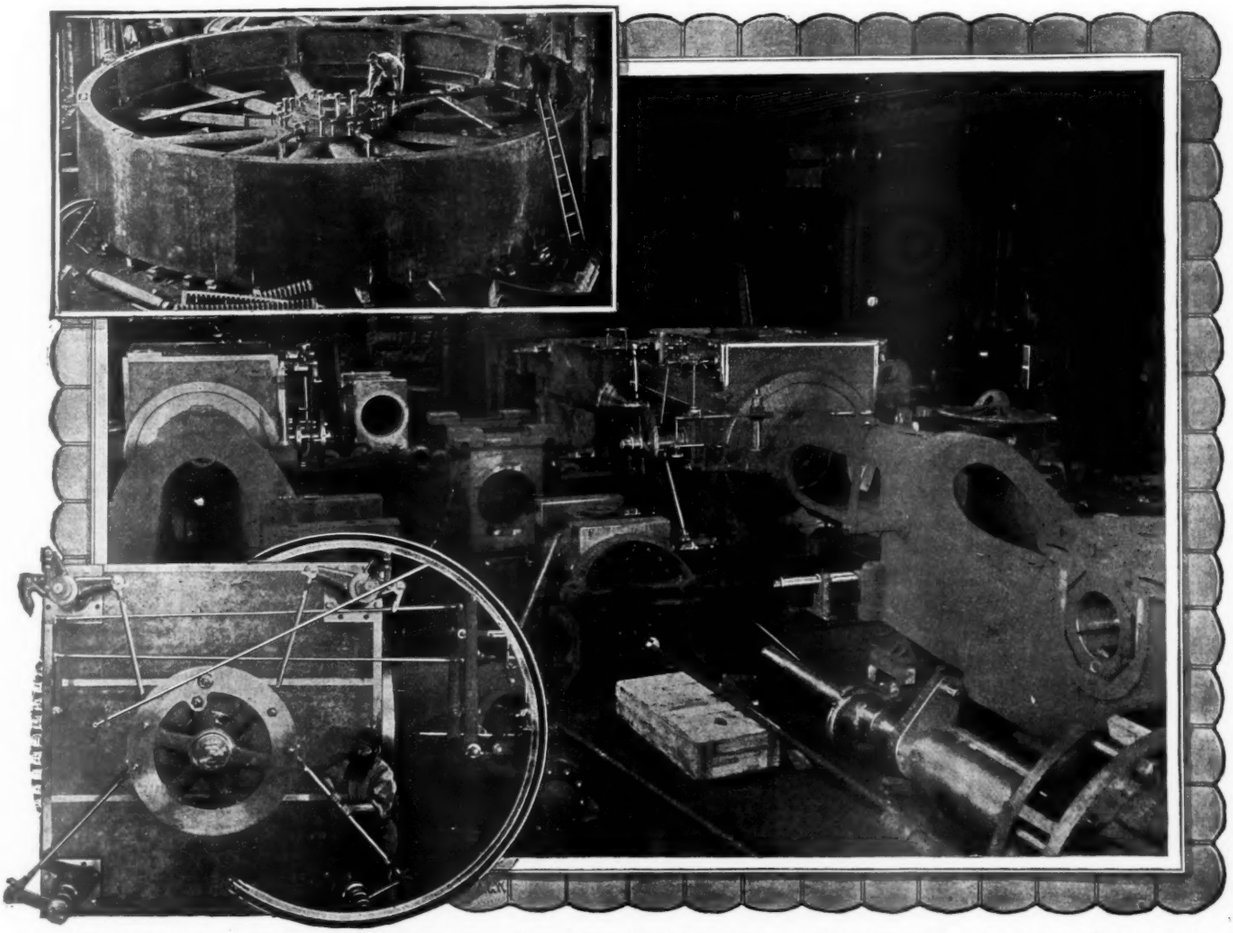
General Electric Company.

The board of directors of the General Electric Company held an important meeting in Boston on Friday of last week. It had been reported earlier in the week that the next dividend of the company would be discussed at this meeting, and it was predicted that the dividend would be passed, or reduced from eight per cent. to four per cent. A director said that only routine business was transacted, and that the dividend question was not discussed at this meeting.

It was announced in Wall street while the board of directors was in session that an opposition company was forming to compete with the General Electric Company.

The rumors further had it that some of the present directors of the General Electric would resign and take a leading part in the new company.

Mr. D. O. Mills, whose name was mentioned in this matter, declined to confirm or deny the rumor. He said: "We do not talk about what we intend to do, for sometimes we change our minds."



INTERIOR VIEW OF THE NORTH RELIANCE ERECTING SHOP OF THE EDWARD P. ALLIS COMPANY, AT MILWAUKEE, WIS., SHOWING THE WORLD'S FAIR QUADRUPLE ENGINE IN PROCESS OF CONSTRUCTION.

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CONTENTS.

	PAGE
Views, News and Interviews	73
An Electric Fire Engine	73
World's Fair Exhibit of the Page Belting Company	73
World's Fair Prize Winners' Exposition	73
Electricity of the Sun	74
A Powerful Electric Elevator	74
Business	74
Gassner Cells Recommended for Supplying Current to Transmitters	75
Ranald T. McDonald	75
Electric Light Flashes	75
World's Fair Awards	76
A Guide Block for Running Wires	76
The Edison Current for Cautery Purposes	76
Receiver for Alexander, Barney & Chapin	76
The Allis World's Fair Engine	77
Improving the Chicago Telephone Service	77
General Electric Company	77
Price of Incandescent Lamps in Europe	78
A Novel Race	78
A Midwinter Fair	78
Letters from a Laboratory	78
General Notes	79
A Non-Luminous Body	79
Wayside Ambition	79
Wall Street and the Electrical Stock Market	79
A Remarkable Work That Has Met With Rare Success	79
Panics of the Past	79
Telephone Chat	79
To Stop Electric Cars When the Brakes Fail	79
Personal	79
Underwriters' International Electric Association	80
Resolutions on the Death of Louis W. Burnham by His Company	81
Engineering Association of the South	81
The Bradbury-Stone Storage Battery	81
Amazing Advance in the Application of Electricity Since 1876	81
Their Telephone	82
Figures on the Recent Tests with the Conduit of the Universal Electric Company	82
Trolley Road Employés Arrested for Theft	82
Electrical Engineering in New Zealand	82
Advance Information	83
Electro-Therapeutists Meet in New York	83
The Maddox Cotton and Wire Belting	83
A New Method for the Control of Electric Energy	83
Kindred Interests	84
New York to Boston Only $3.00	84
Electrical Patents	viii
Trade Notes	viii
Literary	viii

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
American Electrical Works, insulated wire	i
American Railway Improvement Co	i
Ansonia Brass & Copper Co., wire	xii
Armington & Sims, engines	xii
Beacon Vacuum Pump and Electrical Co	i
Campbell Electrical Supply Co., insulating tape	i
Claflin & Kimball, Novak inc. lamps	i
Day's Kerite, insulated wire	i
Eastern Electric Cable Co., insulated wire	xii
Eddy Electric Mfg Co., motors	i
Empire China Works, porcelain specialties	xii
Faraday Carbon Co., carbons	xii
General Electric Co., multipolar transformers	ii
Goubert Manufacturing Co., Stratton separators	xii
Hampson & Co., E. P., engines	xii
Hulbert Fence and Wire Co	xii
Jewell Belting Co., belts	xii
Moore, Alfred F., wire	xii
National India Rubber Co., wires and cables	i
Okonite Co., insulated wire	i & xii
Paine & Ladd, patent attorneys	i
Rhode Island Tool Co., drop forging, etc	xii
Ridlon & Co., general machinery	xii
Riker Electric Motor Co., motors, dynamos	i
Simplex Electrical Co., insulated wire	i
Stirling Co., boilers	xii
Waterhouse, Gamble & Co., arc lamps	i
Westinghouse Electric & Manufacturing Co.	xi
Weston Engine Co., engines	i
Wilmot & Hobbs Mfg. Co., bell gongs	xii

INSIDE PAGES.

Allis & Co., Edward P., engines	v
American Bell Telephone Co	ix
Baker & Co., platinum	v
Barrett, John A., electrical engineer	viii
Berlin Iron Bridge Co., iron roofs and buildings	v
Bishop Gutta Percha Co., insulated wire	84
Brill Co., J. G., tramway cars	vii
Brixey W. R., Kerite wires	vi
Brush Electric Co., apparatus	ix
Buckeye Engine Co., engines	vii
Case Engine Co., J. T., steam engines	vi
Columbia Incandescent Lamp Co., incandescent lamps	vi
Cutter, George, electrical supplies	vi
Denver Highlands Electric Co	84
Dixon Crucible Co., belt dressing	vii
Edison Decorative and Miniature Lamp Department, incandescent lamps	84
Electric Construction and Supply Co., Ward arc lamps	iii
Electric Selector and Signal Co	iv
Electro-Light Engraving Co., engraving	84
Equitable Life Assurance Society	84
Falls Rivet & Machine Co., friction clutches	v
Fidelity Carbon Manufacturing Co., carbons	iv
General Electric Launch Co., electric launches	viii
General Incandescent Arc Light Co., arc lamps	vii
Greeley & Co., The E. S., supplies	iv & v
Harrisburg Foundry & Machine Works, engines	vii
Helios Electric Co., arc lamps	v
Holmes, Booth & Haydens, insulated wire	vi
Johns Mfg. Co., H. W., vulcabeston	vi
Lake & Co., J. H. & D., pulleys	viii
Leclanche Battery Co., batteries	viii
Lehigh Valley Creosoting Co., creosoted lumber	84
Marshall, Wm., condensers	viii
National Pipe Bending Co., feed-water heater	iii
New England Butt Co., braiding machinery	vii
New Jersey Lamp & Bronze Works, electric and gas fixtures	v
New York Belting and Packing Co., rubber belts	ix
New York Insulated Wire Co., wires and cables	vi
Ohio State University	viii
Onondaga Dynamo Co., electrical apparatus	iv
Ostrander & Co., W. R., supplies	iv
Partrick & Carter Co., electrical supplies	viii
Phillips Insulated Wire Co., insulated wire	v
Phosphor-Bronze Smelting Co., castings	vii
Photo-Engraving Co., engravings	iv
Pope, Read & Rogers	viii
Porter Electric Motor Co., electric motors	iv
Queen & Co., electrical instruments	84
Ries Electric Specialty Co., regulating socket	ix
Robinson & Orr, steel rails	84
Royal Columbian Electric Co., dynamos and motors	iii
Royce & Marean, electrical supplies	viii
Russell & Co., steam engines	v
Shawmut Fuse Wire Co., fuse wire	viii
Shoemaker, Homer, attorney and counsellor-at-law	viii
Siemens & Halske Electric Co., electrical machinery	iii
Standard Electric Co	iv
Tyndall, Wm. D., attorney	iv
Washburn & Moen Mfg. Co., wire	viii
Western Electric Co., supplies	ix
Weston Electrical Instrument Co., measuring instruments	vi
White Dental Mfg. Co., acid gravity battery	viii
Whitney Electrical Instrument Co., instruments	iii
Wilson, Fremont, electrician	viii

The electrical business, like the man flat on his back, is looking up.

A nut for the manufacturer and dealer: If you want a big fall trade, *advertise now.*

We have observed in several of the Brooklyn trolley accidents that the brakes would not work and the car would not stop, and, therefore, the killing or maiming of the victims was inevitable. In no one of these cases has it been recorded that the conductor had sense enough to disconnect the trolley. The car cannot run if the trolley is disconnected and it might be well for conductors to learn this.—*New York Morning Advertiser.*

Well, well, well! What becomes of the momentum of the car? Supposing the motorman wants to reverse the motor?

We are pleased to notice that the Broadway cable car companies are trying some experiments with fenders. Several of their cars have been equipped with a pneumatic tired fender which, from all indications and previous trials, would seem to fill the bill. However, some arrangement to enable those caught by the scoop to grasp something more tangible than air and less solid than the sharp iron corners of the front dashboard would be a valuable addition. This will undoubtedly come sooner or later. We hope that it will not be too late.

The scene was in a burning building; the firemen, hurrying in many directions, did all in their power to arrest the flames. Stationed at each landing was a patrolman, who, during the several lulls in the proceedings, philosophized with the once frightened but now reassured tenants. Said one: "It's matches, I tell you. You see, the servant girl lights the lamp or the gas, finds it easier to throw the match in some corner, and there you are. The smoldering commences and only stops when a blaze starts in on its work. The building burns up, and the insurance companies have to foot the bills. All this would be changed if we had electricity everywhere, and it seems to me that the sooner this is done the better." The fireman hit the nail on the head. Yet, notwithstanding this fact, as soon as wires are put into a building up go the rates of insurance. Why should this be?

PRICE OF INCANDESCENT LAMPS IN EUROPE.

The following from our contemporary, London *Electrician*, is of interest at this time to lamp manufacturers in this country:

To have kept up the price of glow lamps at 3*s.* 9*d.* until their retail establishments closed on the evening of November 9 would have been a foolish proceeding on the part of the Edison and Swan United Company. Foreign lamps, and cheap ones, are sure to be offered, together with the perhaps half-hatched productions of inexperienced English makers. With the view of retaining as many of their old customers as possible, as well as to show what they can do at a more moderate price, lamps of 8, 10 and 25 candle-power were reduced yesterday to 1*s.* 9*d.* It is to be hoped that 12 months hence our central station managers will not be repeating the lamentations recently indulged in by Herr Clarence Feldman, electrical engineer to the Cologne municipality. "The recent fall in the price of incandescent lamps," says Herr Feldman, "does not appear to be by any means an unmixed blessing. When we consider what accuracy is required, what perfection in the filament, and how the light produced varies with the potential of the current, being approximately proportional to its sixth power, we see that it will now be more unsafe to rely upon the lamps being correctly adjusted to absorb the right quantity of current at the right potential. The limit of error has hitherto been about two per cent. either way, but with the new price, one shilling per lamp, it will hardly be possible to come nearer than four volts either way."

A NOVEL RACE.

Publisher W. J. Arkell, of *Frank Leslie's Weekly* and *Judge*, has offered to give a $1,000 cup to the winner of a trial of speed, over a course of not less than 10 miles long, between the crack locomotives of England, France, Germany and America, now on exhibition at the World's Fair.

Mr. Arkell has written a letter to Mr. George H. Daniels, general passenger agent of the New York Central Railroad, asking the company to enter a locomotive to represent the United States. Mr. Arkell and Mr. Daniels have gone to Chicago to have a talk about the subject with the representatives of foreign railroads at the Fair. It is probable that the Central's speeder "No. 999," will uphold the glory of American engine building.

A race between the various types of trolley cars on exhibition at the Fair would be an interesting feature, and if the facilites for such a trial can be arranged the ELECTRICAL REVIEW stands ready to offer a suitable prize to the winner.

A MIDWINTER FAIR.

The midwinter fair at San Francisco, where the climate is a delight, should have a strong electrical department. It will be visited by large numbers from all parts of this country, as well as by the people beyond the Pacific, and in addition to presenting their products to these, the electrical industry will have a magnificent opportunity to show them to the great and rapidly developing State of California. We hope to see the leading electrical manufacturers well represented.

Mr. M. H. de Young, proprietor of the San Francisco *Chronicle*, is the Director-General of the Fair, and a knowledge of his great energy and exceptional abilities leads the ELECTRICAL REVIEW to assure its readers that the event will be a pronounced success, and that the electrical interests, if they ask it, will receive every attention they could desire. The Fair will be held during January and February of next year.

Mr. Franklin L. Pope, the well known electrical expert, has suggested that mechanical engineers turn their attention to the building of electric cars of lighter construction, looking to the bicycle as a model. Here is a machine weighing as little as 25 pounds and carrying a weight five or six times as great, at a speed of from 15 to 20 miles an hour. The electric car has a smoother road to travel than the bicycle, and Mr. Pope wants to know why an electric car may not be constructed in which the proportion of dead weight per passenger will be but little if any greater than it is in the bicycle.

LETTERS FROM A LABORATORY.—LXV.

BY JULIAN A. MOSES.

The question has often been asked: Do the improvements arising from the advancing state of our mechanical and electrical sciences injuriously affect art? Those who take the ground that they do, point with a sort of reverential awe to the work of the old masters, and say: "Can the work of this day compare with the broad beauty and calmness of the old schools? See the proof of how civilization brings us farther from nature." While there is a great deal of truth in what they say, they have a narrow field of vision, and they do not look for the beauties of improvements. The chances are that these people are entirely unpractical.

A very good example was forcibly brought to my mind recently.

Chancing in the warerooms of one of our first-class importers of bronzes and artistic ornaments of the first quality, I admired, particularly, a delicate plate glass screen, framed in exquisite wood and gilt bronze work. The workmanship put upon this bit of furniture showed the masterhand of the manufacturer.

"You are pleased with that?" queried the polite salesman.

I answered in the affirmative, and told him that the gilding seemed remarkably well done, and I presumed that it was electroplated.

"No," said he, "the man who manufactured that screen is unpractical. Why the gilding on that small frame cost $200. You seem surprised, but you should know that every bit of that gold has been burnt on to the bronze underneath."

Numerous other pieces around the room showed the same good quality—heavy, solid, and, in short, they were built to last.

This style of manufacture is allowable, even advisable, provided there are purchasers for the *objets de vertu* thus made, but only the very rich can afford to become their owners. The French manufacturers of bronzes, who are perhaps the finest in the world, seem to scorn the use of the electroplating baths for the production of their bronze copper and brass *articles de luxe*. Their object, however, as they say, is not merely cheapness; but looked at from their economic standpoint their great desire is to produce the highly artistic entirely disregarding what they consider to be the trivial matter of cost. It is entirely immaterial, they declare, what a thing costs, provided they can sell it. As this is the true spirit of business, although they seem to call it art, it would tend somewhat to show that beauty is, with them, merely one consideration. The principal motive which actuates these manufacturers, that of producing the very best that they can is hardly equal to the task of overcoming what they possess in a more or less marked degree, that predominating quality of conservatism.

These few seem not to care for the many improvements available through the agency of electricity, but prefer to plod along in the well-worn paths, declaring that those things made by the hand of man, without the intervention of art-destroying machines, have shown, and will continue to show themselves to be superior in workmanship, quality and durability. There are no machines which can give the artistic curves such as the hand of man alone can produce, for their very beauty lies in their irregularity and artistic unsymmetries. Still there can be no very plausible reason, where the cheaper yet outwardly and for all practical purposes ornamental bronzes are desired, why the aid of electricity should not be employed. But for some almost unaccountable, perhaps hereditary reason, old methods and practices are religiously retained.

It will be found, after all, that it will be the Americans who will first, as they have always done, avail themselves of these improvements, and in the very near future be able to instruct the Europeans in the arts in which they were once masters.

GENERAL NOTES.

A telephone system is being put in at Groveton, N. H.

Suncook, N. H., has voted to have its streets lighted by electricity from Garvin's Falls.

The East Fourth Street line of the City Railway Company, of Wilmington, Del., is being changed to an electric railway.

It is a pleasant time of year to be in Chicago, and this is another good reason why you should not fail to visit the World's Fair. Can't you go this week?

Stillwater, Minn., will no longer be in darkness, the council having entered into a contract for street lighting with the electric light company last week.

The Woonsocket, R. I., Street Railway Company will extend the trolley system from Monument square to St. Charles Church to accommodate Sunday travel.

The Boston Electric Light Company has declared the usual quarterly dividend of two per cent., payable October 24, to stockholders of record September 30.

The General Electric Railroad Company will erect its power house on Sycamore street, near the Louisville and Nashville Railroad passenger depot, in Bellville, Ill.

John Cummings, of Providence, R. I., has sued the Worcester, Leicester and Spencer Electric Railway Company in an action of tort, with damages in the sum of $20,000.

Mr. Lemuel Bannister, general manager of the Westinghouse Electric and Manufacturing Company, who has been in Europe for some time, is expected to arrive in New York this week.

The post-office department, Toronto, Ont., has entered into a new contract with the Hamilton Street Railway Company to carry the postmen on the trolleys. The figure this year is $900, an increase of $300 over last year.

The Hyde Park Thomson-Houston Electric Light Company, of Chicago, which furnishes light south of Forty-seventh street, held its annual meeting last week, at which time the following directors were chosen: H. N. Hibbard, O. F. Lindman, J. H. Ware, P. G. Kammerer, John Griffith, John M. Fiske, E. C. Ward.

The Brush Electric Light and Power Company, at Atlanta, Ga., was capitalized at $250,000 last week and absorbed the People's Electric Light and Power Company, recently established in connection with the Electric Railway Company, which promised to be a powerful rival to the old company. The deal was effected by an exchange of stock.

The San Francisco and San Mateo Electric Railway Company has made all necessary arrangements for an innovation in street railroad business and will begin at once to put the new plan into operation. In so doing it will enter into competition with the Southern Pacific Company in carrying parcels and United States mails as far as Baden, or South San Francisco, and human remains to San Mateo county cemeteries.

It is reported that Buffalo and Sanborn, N. Y., will be connected by an electric railway. The projected route begins at the line of the Buffalo and North Tonawanda line in South Tonawanda, then crosses the Tonawanda Creek at the Mile Road, thence runs to the Rewey Road, which it follows to the Ward Road, and then along the latter to Sanborn. The whole distance is about 6½ miles. The officers of the company are: L. F. W. Ahrend, president; Lewis T. Paine, of Tonawanda, vice-president; Lee R. Sanborn, of Sanborn, secretary; Edward G. Reisterer, of Tonawanda, treasurer; and John H. Pardee, of Buffalo, attorney.

A Non-Luminous Body.

(From Truth.)

"Johnny, get up; the sun has been up three hours."

"Let him; I don't have to shine for a living."

Wayside Ambition.

(With Apologies to the Chicago Record.)

I want to be an 'lectrician,
Hot stuff!
Rubbin' up dinnymos and 'ingynes bright,
Pumpin' juice inter wires to make light,
Turnin' a wrench to make things tight—
That's what an 'lectrician does.

I want to be an 'lectrician,
Gee whiz!
Makin' the boys keep outside the station,
Cussin' the firemen like tarnation,
One o' the big bugs o' creation—
That's an 'lectrician, I tell ye!

I want to be an 'lectrician,
By gum!
Runnin' wires fer bells an' calls,
Settin' machines with blocks an' falls,
Francin' round in check overhauls—
There's an 'lectrician fer ye!

I want to be an 'lectrician,
Dog gone!
Inventin' lamps an' cut-out switches,
Makin' kinks an' new half-hitches,
Lots o' money in my breeches—
I'll be one, some day, too!

—VOLTABOUT.

Wall Street and the Electrical Stock Market.

Stock speculation during the week has been controlled by the estimated chances for or against the repeal of the Sherman law. Periods of strength or weakness followed the reports from Washington as they indicated that prospects for repeal were bright or dark.

Money on call continues easy, but time loans on commercial paper have been steadily growing scarcer.

The bond declines in electrical securities during the week were Edison Electric Illuminating Company's 5s, one-half points, and General Electric Company's 5s, seven points. General Electric sold highest during the week at 45⅝, and lowest at 39⅝. Western Union sold between 82¾ and 78. Edison Electrical Illuminating ranged between 94 and 91.

The decline in General Electric was on liquidation by some holders who take it for granted that the failure of the directors to declare a dividend yesterday means a practical suspension of dividends. Last year the transfer books closed for the dividend on October 16, and the dividend was paid November 1. The stories current about an opposition company being formed have met with denials from parties mentioned in the rumors.

The closing quotations of electric securities on the Boston Stock Exchange to-day were as follows:

	Bid.	*Asked.*
Boston Electric Light		105
Edison Electric Illuminating	122	125
General Electric	41	41½
General Electric pf	65	73
Westinghouse Electric	20	21
Westinghouse Electric pf	..	39
Fort Wayne Electric	4¼	4¾
Thomson-Houston Trust (series D.)	5	5½

New York, September 30.

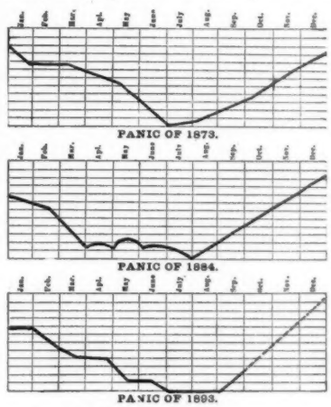
A Remarkable Work That Has Met With Rare Success.

Last year Moses King, of Boston, the publisher of the well-known series of "King's Hand-books," published "King's Hand-book of New York City." He made 10,000 copies, on the supposition that so large an edition would last for 10 or 12 months, anyway. As a matter of fact, in four weeks' time the whole 10,000 copies were sold. The second edition is now announced. It comprises 20,000 copies, half of which are needed to fill advance orders. The new edition is not a reprint of the old book, but is, in fact, a new book, showing New York in 1893. Eighty pages have been added, 300 new engravings have been made, nearly all the pages have been reset, the index is wholly remade, and the whole text has been revised, extended and improved. Everybody admits that this is the most thorough presentation of the greatness of New York city that has ever been made. The book has been sent the world over, to give to other nations an idea of the magnitude and grandeur of the American metropolis. It contains 1,008 handsome pages, more than 1,000 new photographic illustrations. It is an exceptionally fine specimen of the bookmaker's art, and is worthy of a conspicuous place in every library and drawing-room. It is a book so good that every New Yorker, and any one who has any interest in New York, will be pleased to own a copy. It is so cheap that every one can easily afford to obtain it. Besides being practically exhaustive, decidedly pictorial, exceptionally handsome, remarkably cheap, it is also virtually authentic; for more than three thousand New Yorkers have revised such parts of it as they were directly interested in. The book, at its close, bears evidence of its pains-taking make up; for it winds up with a most elaborate index of twenty-four pages of small, solidly packed, yet very clear type. By the aid of "King's Hand-book of New York City" any one can easily know everything that is generally worth knowing about the foremost city of the Western Hemisphere. Its price is but two dollars a copy, and its editor and publisher is Moses King, Boston, Mass.

Panics of the Past.

The leading industrial journal of the South, *Dixie*, published at Atlanta, Ga., has sent out the chart printed below, illustrating very graphically and interestingly how the panics of the past have affected southern industry. The longitudinal lines represent degress of prosperity in the several months of the year and the heavy curves show the course of trade during the panic year. An inspection will show that the revival of trade occurred about July 1, 1873; August 1, 1884; and September 1, 1893. The revivals, as the curves illustrate, were rapidly ascending ones, business at the end of 1873 being one degree below what it was at the beginning of the year. At the end of 1884 business was about three degrees better than it was on January 1 of the same year. The rapid revival of southern trade since September 1, 1893, lends force to the prediction of prosperous times for the remainder of the year, as indicated by the dotted line running through October, November and December.

Of course, these curves apply only to Southern trade, but if an average of the business of the whole country during the three panic years could be struck, the curves would doubtless be very similar, though perhaps a little more complex. The South gets nearly four hundred million dollars in spot cash every fall for her cotton crop. The above chart proves conclusively that no



CURVES SHOWING THE COURSE OF SOUTHERN TRADE DURING PANICS OF THE PAST.

panic has ever withstood this golden flood. The decided improvement that has already taken place is abundant proof that this fall's crop will bring about the usual result. All sections will revive in time, but the South has the call on the ready money of the country for the next four months. Four hundred million dollars is a lot of money, and it will work a marvelous change in southern conditions.

TELEPHONE CHAT.

Harrow, Mich., now has telephone connection with Detroit.

The long-distance telephone has been put in operation between Norway and Sweden, and his majesty at Christiana can communicate directly by word of mouth with his ministers at Stockholm. The length of the line between the two capitals is 385 miles, and the cost of a three minutes' conversation is equal to 41 cents of our money, with 14 cents more for each additional three minutes.

The Bell Telephone Company's instrument exhibit for the month ending Sept. 20 shows that 2,826 more instruments were taken out than were rented, against 2,435 for the previous month. The comparative statement for the month and nine months follows:

Month Sept. 20.	1892-'93.	1891-92.	Decrease.
Shipments	3,535	7,166	3,631
Return	6,361	4,518	*1,843
Net output	†2,826	2,648	5,474
Since Dec. 20.			
Shipments	67,162	72,385	5,223
Returned	45,709	39,000	*6,709
Net output	21,453	33,385	11,932
Instruments in use Sept. 20	574,173	542,792	*31,381

*Increase. †Deficit.

To Stop Electric Cars when the Brakes Fail.

TO THE EDITOR OF ELECTRICAL REVIEW:

Your editorial in issue of September 30, in reference to trolley accidents, is well timed, and while the motorman or "motorneer," as he is sometimes called, is not altogether the party to blame in reference to the accidents which are now being and have been reported very largely in the papers in this vicinity, it nevertheless is true that some method is required in the operation of electric cars, whereby a car can be brought to a stop without injury to the motors, and independent of the brakes, whenever it is necessary to prevent the loss of life, or for any other exceptional interference with the traffic.

I am pleased to say that in a short time I will be able to present to you for publication a system which will cover the following points:

First.—A single motor supported flexibly on truck without increasing dead weight on axles.

Second.—Motor to be constant speed and to run whether car is stopped or in operation.

Third.—An exceptionally simple device for conveying power to both car axles. This device arranged so that the speed of the car can be varied to suit the requirements, while the motor is running at constant speed; this being accomplished also without any loss of power, caused by friction, etc., which would naturally prohibit the use of such mechanism.

Fourth. A simple and cheap method, which is also positive and effective for reversing a car without reversing the motor.

Fifth. This reversing device operates in such a manner that when it is adjusted to permit the car to run forward, it is utterly impossible to run the car backwards until the reversing mechanism has been operated to permit this movement of the car.

Sixth. With the constant speed motor there is no need of any controlling mechanism similar to the multiple series controller.

Seventh. The car is operated by one lever, which starts and stops, reverses and changes the speed of the car as desired.

Eighth. If desired, constant speed motor could be of the synchronous type.

With a car equipped in the above manner, should it be necessary to reverse the car to save a human life, it would not be necessary to use the brake whatever in order to bring the car to a stop, as the reversing mechanism absolutely locks the wheels so that they cannot revolve in the same direction in which the car is going, and the car must, therefore, necessarily act as though the wheels were skidded, and would slide along the rails at the same time the motor would be running, but with no load on it, or, if desired, the power could be utilized to turn the wheels backwards, as is usually done now with the common method of reversing, but such would not be necessary, as the means for locking the wheels without injury to the motor, would be undoubtedly all that would be necessary to use in such a case.

Another idea of great advantage is that it would be almost next to impossible to have an accident similar to the serious one which occurred recently in Cincinnati, where the car went down a grade, the brakes or the motor failing to operate; also in going up a grade it would not be necessary to have a car stop with the brakes on, as the mechanism conveying the power from the motor to the axles operates only in one direction, unless the same is reversed, and when the car is going in either direction it is impossible to run it backwards, unless the reversing mechanism is thrown into action. The idea will be more fully presented to you in detail later on. S.

New York, Sept. 30.

PERSONAL.

M. Alexander de Smirnoff, electrical engineer for the ministry of the Imperial Court of Russia, and editor-in-chief of the Russian journal *Electrischestwo* (electricity), has been paying a visit to some of his American contemporaries

Providence, R. I., was the victim last week of the sudden visitation in one day of Cyrus O. Baker, Jr., Willard L. Candee, Geo. T. Manson and Geo. F. Porter, all well-known electrical men. Providence, at last reports, was in a fair way to recover.

Underwriters' International Electric Association.

REPORT OF THE ELECTRICAL COMMITTEE.

The Electrical Committee of the Underwriters' International Electric Association has rendered the following report, under date of September 20, 1893, which should be of interest to the whole electrical fraternity. It is, therefore, published in full.

AMENDMENTS TO THE RULES OF THE UNDERWRITERS' INTERNATIONAL ELECTRIC ASSOCIATION FOR ELECTRIC WIRING RECOMMENDED BY THE ELECTRICAL COMMITTEE.

Rule 5 Resistance boxes and equalizers.—Amend section (*b*) to read as follows:

b. Must be placed on the switchboard, or, if not thereon, at a distance of a foot from combustible material, or separated therefrom by a non-inflammable, non-absorptive, insulating material.

Rule 8. Motors.—Amend section (*b*) to read as follows:

b. Must be thoroughly insulated, mounted on filled dry wood, be raised at least eight inches above the surrounding floor, be provided with pans to prevent oil from soaking into the floor, and must be kept clean.

Rule 9. Resistance boxes.—Amend section (*b*) to read as follows:

b. Must be placed on the switchboard, or at a distance of a foot from combustible material, or separated therefrom by a non-inflammable, non-absorptive, insulating material.

Rule 13. Arc lamps.—Amend section (*f*) to read as follows:

f. Must be provided with a wire netting around the globe, and an *approved* spark arrester above to prevent escape of sparks, melted copper or carbon, where readily inflammable material is in the vicinity of the lamps. It is recommended that plain carbons, not copper plated, be used for lamps in such places.

Rule 13. Arc lamps.—Add new section as section (*g*) as follows:

g. Hanger boards must be so constructed that all wires and current carrying devices thereon shall be exposed to view, and thoroughly insulated by being mounted on a waterproof, non-combustible substance. All switches attached to the same must be so constructed that they shall be automatic in their action, not stopping between points when started, and preventing an arc between points under all circumstances.

Rule 16. Underground conductors.—Add new section as section (*c*) as follows:

c. Must not be so arranged as to shunt the current through a building around any catch-box.

Rule 18. Conductors.—Amend section (*b*) to read as follows:

b. Must be protected when passing through floors; or through walls, partitions, timbers, etc., in places liable to be exposed to dampness by waterproof, non-combustible, insulating tubes, such as glass or porcelain.

Must be protected when passing through walls, partitions, timbers, etc., in places not liable to be exposed to dampness by *approved* insulating bushings specially made for the purpose.

Rule 20. Mouldings.—Add new section as section (*c*) as follows:

c. Must be made of two pieces, a backing and capping, so constructed as to thoroughly encase the wire, and maintain a distance of one-half inch between conductors of opposite polarity, and afford suitable protection from abrasion.

Rule 21. Special wiring.—Amend first paragraph so as to read as follows:

In breweries, packing houses, stables, dyehouses, paper and pulp mills, or other buildings specially liable to moisture or acid, or other fumes liable to injure the wires or insulation, except where used for pendants, conductors ——

Rule 21. Special wiring.—Add new section as section (*e*) as follows:

e. Must be protected when passing through floors, walls, partitions, timbers, etc., by waterproof, non-combustible, insulating tubes, such as glass or porcelain.

Rule 22. Interior conduits.—Amend section (*a*) to read as follows:

a. Must be continuous from one junction box to another, or to fixtures, and must be of material that will resist the fusion of the wire or wires they contain, without igniting the conduit.

Rule 22. Interior conduits.—Amend section (*c*) to read as follows:

c. Must be first installed as a complete conduit system, without conductors, strings, or anything for the purpose of drawing in the conductors, and the conductors then to be pushed or fished in. The conductors must not be placed in position until all mechanical work on the building has been, as far as possible, completed.

Rule 22. Interior conduits.—Amend section (*e*) to read as follows:

e. Must not be supplied with a twin conductor, or two separate conductors, in a single tube.

Rule 24. Safety fuses.—Amend section (*b*) to read as follows:

b. Must have fusible wires or strips (where the plug or equivalent device is not used), with contact surfaces or tips of harder metal, soldered or otherwise, having perfect electrical connection with the fusible part of the strip.

Rule 26 Switches.—Amend section (*b*) to read as follows:

b. Must be double pole when the circuits which they control supply more than six 16 candle-power lamps, or their equivalent.

Rule 26. Switches.—Amend section (*e*) to read as follows:

e. Must be placed in dry, accessible places and be grouped as far as possible, being mounted—when practicable—upon slate or equally non combustible back boards. Jackknife switches, whether provided with friction, or spring stops, must be so placed that gravity will tend to open rather than close the switch.

Rule 31. Cord pendants.—Make this heading "flexible cord" instead of "cord pendants."

Rule 31. Flexible cord.—Amend section (*d*) to read as follows:—

d. Must not be used in show windows.

Rule 33. Amend to read as follows:—Converters must be located at a point as near as possible to that at which the primary wires enter the building, and must be placed in a room or vault constructed of, or lined with, fire resisting material, and used only for the purpose. They must be effectually insulated from the ground, and the room in which they are placed be practically air-tight, except that it shall be thoroughly ventilated to the outdoor air, if possible, through a chimney or flue.

Rule 40. Lighting and power from railway wires.—Amend section (*a*) to read as follows:

a. Must not be permitted under any pretense in the same circuit with trolley wires with a ground return, nor shall the same dynamo be used for both purposes, except in street railway cars, electric car houses, and their power stations.

DEFINITIONS RECOMMENDED BY THE ELECTRICAL COMMITTEE FOR THE WORD APPROVED AS USED IN THE RULES FOR ELECTRIC WIRING RECOMMENDED BY THE UNDERWRITERS' INTERNATIONAL ELECTRIC ASSOCIATION.

Rule 2. Care and attendance:

Approved waste cans shall be made of metal, with legs raising can three inches from the floor, and with self-closing covers.

Rule 8. Motors:

Section *c*. From the nature of the question, the decision as to what is an *approved* case must be left to the Inspector to determine in each instance.

Rule 10. Outside conductors:

Section *a*. Insulation that will be *approved* for service wires must be solid, at least $\frac{3}{64}$ of an inch in thickness, and covered with a substantial braid. It must not readily carry fire, must show an insulating resistance of one megohm per mile after two weeks' submersion in water at 70 degrees Fahrenheit, and three days' submersion in lime water, with a current of 550 volts and after three minutes' electrification.

Rule 12. Interior conductors:

Section *d*. Insulation that will be *approved* for interior conductors must be solid, at least $\frac{2}{64}$ of an inch in thickness, and covered with a substantial braid. It must not readily carry fire, must show an insulating resistance of one megohm per mile after two weeks' submersion in water at 70 degrees Fahrenheit, and three days' submersion in lime water, with a current of 550 volts, and after three minutes' electrification.

Rule 13. Arc lamps:

Section *c*. The hand switch to be *approved*, if placed anywhere except on the lamp itself, must comply with requirements for switches on hanger boards as laid down in new section (*g*) of Rule 13.

Rule 13. Arc lamps:

Section *f*. An *approved* spark arrester is one which will so close the upper orifice of the globe that it will be impossible for any sparks thrown off by the carbons to escape.

Rule 15. Outside overhead conductors:

Section *b*. An *approved* fusible cut-out must comply with the sections of Rules 23 and 24, describing fuses and cut-outs.

Rule 17. The switch required by this rule, to be *approved*, must be double pole, must plainly indicate whether the current is "on" or "off," and must comply with Sections *a*, *c*, *d* and *e* of Rule 26 relating to switches.

Rule 18. Conductors:

Section *a*. In so-called "concealed" wiring, moulding, and conduit work, *and* in places liable to be exposed to dampness, the insulating covering of the wire, to be *approved*, must be solid, at least $\frac{3}{64}$ of an inch in thickness, and covered with a substantial braid. It must not readily carry fire, must show an insulating resistance of one megohm per mile after two weeks' submersion in water at 70 degrees Fahrenheit, and three days' submersion in lime water, with a current of 550 volts and after three minutes' electrification.

For work which is *entirely* exposed to view throughout the whole interior circuits, and not liable to be exposed to dampness, a wire with an insulating covering that will not support combustion, will resist abrasion, is at least $\frac{1}{16}$ of an inch in thickness, and thoroughly impregnated with a moisture repellent, will be *approved*.

Rule 18. Conductors:

Section *b*. Second paragraph. Except for floors, *and* for places liable to be exposed to dampness, glass, porcelain, *metal-sheathed* interior conduit and Vulca tube, when made especially for bushings, will be *approved*. *The two last named will not be approved if cut from the usual lengths of tube made for conduit work, nor when made without a head or flange on one end.*

Rule 21. Special wiring:

Section *b*. The insulating covering of the wire to be *approved* under this section must be solid, at least $\frac{3}{64}$ of an inch in thickness, and covered with a substantial braid. It must not readily carry fire, must show an insulating resistance of one megohm per mile after two weeks' submersion in water at 70 degrees Fahrenheit, and three days' submersion in lime water, with a current of 550 volts, after three minutes' electrification, and must *also* withstand a satisfactory test against such chemical compounds or mixtures as it will be liable to be subjected to in the risk under consideration.

Rule 23. Double pole safety cut-outs:

Section *a*. To be *approved*, boxes must be constructed, and cut-outs arranged, whether in a box or not, so as to obviate any danger of the melted fuse metal coming in contact with any substance which might be ignited thereby.

Rule 27. Fixture work:

Section *a*. Insulating joints to be *approved* must be entirely made of material that will resist the action of illuminating gases, and will not give way or soften under the heat of an ordinary gas flame. They shall be so arranged that a deposit of moisture will not destroy the insulating effect, and shall have an insulating resistance of 250,000 ohms between the gas pipe attachments, and be sufficiently strong to resist the strain they will be liable to in attachment.

Rule 37. Power stations:

Section *a*. Automatic circuit breakers should be submitted to the committee for *approval* before being used.

Rule 43. Storage of primary batteries:

Section *b*. Insulators for mounting secondary batteries to be *approved* must be noncombustible, such as glass, or thoroughly vitrified and glazed porcelain.

RECOMMENDATIONS OF THE ELECTRICAL COMMITTEE AS TO APPROVAL OF CERTAIN WIRES AND MATERIALS, AND THE INTERPRETATION OF CERTAIN RULES.

Rule 4. Switchboards:

Section *a*. Special attention is called to the fact that switchboards should not be built down to the floor, nor up to the ceiling, but a space of at least 18 inches, or two feet, should be left between the floor and the board, and between the ceiling and the board, in order to prevent fire from communicating from the switchboard to the floor or ceiling, and also to prevent the forming of a partially concealed space very liable to be used for storage of rubbish and oily waste.

Rule 5. Resistance boxes:

Section *a*. The word "frame" in this section relates to the entire case and surrounding of the rheostat, and not alone to the upholding supports.

Rule 9. Resistance boxes:

Section *a*. The word "frame" in this section relates to the entire case and surroundings of the rheostat, and not alone to the upholding supports.

Class B:

It is the sense of the Electrical Committee that any circuit attached to any machine, or combination of machines, which develop over 300 volts difference of potential between any two wires, shall be considered as a high potential circuit and coming under that class, unless an *approved* transforming device is used, which cuts the difference of potential down to less than 300 volts.

Rule 10. Outside conductors:

Section *f*. It is the sense of the Electrical Committee that all joints must be soldered, even if made with the McIntyre or any other patent splicing device. This ruling applies to joints and splices in all classes of wiring covered by these rules.

Rule 15. Outside overhead conductors:

Section *b*. The cut-out required by this section must be placed so as to protect the switch required by Rule 17.

Rule 16. Underground conductors:

Section *b*. The cut-out required by this section must be placed so as to protect the switch.

Rule 22. Interior conduits:

It is recommended that the American Circular Loom Company's tube, the *metal-sheathed* interior conduit tube and the Vulca tube be approved for the class of work called for in this rule.

Materials:

The following are given as a list of noncombustible, non-absorptive, insulating materials, and are listed here for the benefit of those who might consider hard rubber, fibre, wood and the like, as fulfilling the above requirements. Any other substance which it is claimed should be accepted, must be forwarded for testing before being put on the market:

1. Thoroughly vitrified and glazed porcelain.
2. Glass.
3. Slate without metal veins.
4. Pure sheet mica.
5. Marble (filled).
6. Lava (certain kinds of).

Wires:

The following is a list of wires which have been tested by the committee and found to comply with the requirements for an approved insulation under Rule 10 (*a*), Rule 12 (*d*) and Rule 18 (*a*).

Americanite.
Bishop.
Canvasite.
Clark.
Edison Machine.
Grimshaw (white core).
Habirshaw (red core).
Kerite.
National India Rubber Company (N. I. R.).
Okonite.
Paranite.
Raven Core.
Safety Insulated { Requa white core. / Safety black core. }
Salamander (rubber covered).
Simplex (caoutchouc).

None of the above wires to be used unless protected with a substantial *braided* outer covering.

RULES RECOMMENDED BY THE ELECTRICAL COMMITTEE FOR THE INTRODUCTION OF AUTOMATIC FIRE-ALARM SYSTEMS.

Thermostats must be placed:

1. Not more than 15 feet apart.
2. Not more than 10 feet from any side of any room.
3. Not more than five feet from any side of any room having windows or similar openings.
4. In every room in the building which is separated by partitions running from the floor to the ceiling.
5. At the top of each elevator well and hoistway in the building.
6. In any particular places required by the inspector of the association.
7. In buildings of so called bay construction, so that there shall be a line in each bay, unless the thermostats are placed on a level with the lower side of the timbers forming the bays.

Wires inside buildings:

1. Must be equivalent in conductivity and tensile strength to No. 18 B. & S. copper wire.
2. Must have an approved insulating covering.
3. Unless encased in metal pipes, approved tubing, or thoroughly filled molding, must be run in plain sight and supported entirely on non-combustible insulators.
4. Must be protected from abrasion and from accidental contact with other conductors.

Wires outside buildings:

1. Must be equivalent in conductivity and tensile strength to No. 12 galvanized iron wire.
2. Must have an approved insulating covering.
3. Must have their routes recorded by plans filed at the central station of the alarm company operating them.
4. Must be provided near the point of entrance to the building with some protective device which will operate to shunt the inside wires and apparatus in case of a dangerous rise of potential, and will open the circuit and arrest an abnormal current flow.

Manual alarms:

Must be located near all main and floor exits.

Alarm gongs:

Must be installed in all buildings having a watchman.

In systems operating without a central station, there shall be:

1. An annunciator on the outside of each risk.
2. A gong not less than seven inches in diameter on the outside of each risk.
3. Some means by which the entire system can be tested daily, and also some method by which any trouble which may arise will be located by this test.
4. At least two outside connections, besides the gong on the outside of the building itself. As a general rule these should be selected from the following list, taking the first two that are possible in any particular risk:

(*a*) The nearest fire department house where there are permanent men stationed.

(*b*) The house of the owner, or some responsible employé of the risk equipped, which must be within reasonable distance of the risk.

(*c*) The house of some other party as described in section (6).

(*d*) In some of the larger cities with paid city fire departments the first connection alone may be accepted.

5. A metallic circuit for the whole system.

Note.—It will be seen that the above rules do not in any way relate to what systems shall be approved. The committee have not yet found it possible to enter into this subject or to formulate detailed rules as to what a system shall accomplish or how it shall do it, or what the construction of the thermostats and other apparatus should be.

These rules simply relate to how a system, which *has been approved* by any board or association, should be installed so as to secure the best and most permanent efficiency from such system, regardless of the merits or demerits of the system itself.

MUNICIPAL FIRE ALARM SYSTEMS.

The committee have carefully examined the municipal fire alarm systems of the Gamewell Fire Alarm Company and the Municipal Fire and Police Telegraph Company, and recommend both of the systems as satisfactory for municipal fire alarm service when properly installed and cared for. They also find that the boxes of both systems work perfectly in harmony and without interference with each other when installed on the same circuit, or different circuits of the same system.

The following resolutions were adopted:

Accessible wiring:

Whereas, Under existing practices, but extremely few of the buildings in the United States which are wired are inspected before being closed in by lath and plaster; and,

Whereas, An inspection after such closing in is incompetent and worthless, for the reason no means are known to the electrical profession by which the fire hazard of concealed or inaccessible circuits may be determined, and that a visual examination of all circuits must be had before immunity from fire hazard can be assured; and,

Whereas, By reason of such non-inspection the work of incompetent and irresponsible electricians remains permanently concealed and uninspected, thereby affording ample opportunity for evading the requirements for safety, for practicing gross impositions upon fire underwriters and the public, and imperiling millions in property valuations; and,

Whereas, Only through the use of wire ways is it possible to render concealed wiring permanently accessible; and,

Whereas, Such permanent accessibility renders it possible to thoroughly inspect at any time every installation so wired, and insures trustworthy means for the detection of every piece of defective wiring, of whatever nature; therefore, be it

Resolved, That the use of such wire ways for rendering concealed wiring permanently accessible, be and hereby is most heartily endorsed and recommended; and be it further

Resolved, That such method of accessible concealed construction be and hereby is advised for general use.

Architects:

Resolved, That the Secretary be requested to communicate with the American Institute of Architects, asking co-operation of their Association in an endeavor to have architects, when drawing plans for specifications, make provision for the channeling and pocketing of buildings for electric light or power wires.

Resolved, That they also be requested in specifications for electric gas lighting to require a two-wire circuit, whether the building is to be wired for electric lighting or not, and that no part of the gas fixtures or gas piping be allowed to be used for the gas lighting circuit.

Rule 42. Ground return wires:

Resolved, That the attention of the various boards of underwriters, electricians and the companies be called to the matter of the possible effect upon metallic substances, especially water mains, buried in the ground, from electrolysis, caused by the ground return of single trolley street railway systems.

This seems to be a subject deserving of a great deal of thought and attention on the part of underwriters. The destruction of water mains and other metallic substances in the ground is undoubtedly being accomplished in many places where trolley railroads are used. It is, of course, something that would seldom be brought to notice until the work was completed, and the water main gives way perhaps just at the time when extra pressure is needed for fire department purposes.

That such work of deterioration is progressing, has been definitely proved in a number of places. It was, perhaps, first prominently brought to the attention of street railroad men in the city of Boston, and the West End Street Railway Company has expended thousands of dollars and much time and thought in providing against this trouble to the best of its ability, and it is believed that it has been largely overcome in this place.

Rule 42 gives a method of ascertaining whether the state of affairs is such as would be likely to produce trouble with pipes laid in the earth. It does not seem to be the province of our Association to lay down the manner in which this difficulty shall be removed. In Boston it has been done by using large overhead copper return wires, which connect with the earth return at frequent intervals, and also by bonding together gas and water pipes and the earth return, so as to reduce to the lowest possible minimum all chance of any difference of potential between two given points in the earth; but all these matters are largely technical and difficult of explanation. It is, however, not a difficult matter for underwriters to ascertain in any particular city or town whether there is a greater difference of potential than allowed under this Rule 42, and we believe the allowance under this rule to be large rather than small.

Should it be discovered that they were getting greater difference of potential than allowed in this rule, this Association would be pleased to enter into correspondence either with the underwriters or the street railroad company, and give them the benefit of all suggestions or information which may be at hand.

The object of this resolution is simply to call the attention of underwriters to this matter, which is one of practically very recent development.

ELECTRICAL COMMITTEE.

In accordance with a vote of the committee, Mr. W. H. Merrill, Jr., electrician of the Chicago Fire Underwriters' Association, was added to the committee, and the subject matter was divided and assigned to different members as follows:

Enforcement of Rules and Financial Support of the Association, Mr. Bliven.

Central Stations and Isolated Plants, Mr. McDevitt.

High Potential Systems, Mr. Leloup.

Low Potential, Outside Wiring and Exposed Inside Wiring, Wiring of Special Hazards, and Motors, Mr. Van Geisen.

Low Potential Inside Wiring, Concealed and in Wire Ways, Mr. Low.

Electric Railroads and Storage Batteries, Mr. FitzGerald.

Automatic Fire Alarms and Inspection and Policy Forms, Mr. Merrill.

Testing and Approval of Devices and Material, Mr. Cabot.

Alternating Systems, Arc Lighting on Low Potential Systems, Electric Gas Lighting, Heating Devices, Municipal Fire Alarms and the Press, Mr. Goddard.

Resolutions on the Death of Louis W. Burnham by His Company.

WHEREAS, Louis W. Burnham, vice-president and general manager of the Electric Gas Lighting Company, departed this life August 9, after a brief illness; and

WHEREAS, The board of directors of the company desire to put on record their high appreciation of their deceased associate, and deep sense of the great loss which the board and the company has sustained; therefore,

Resolved, That in the decease of one who has been so constant, so able and so indefatigable in developing and advancing its interests, this corporation has lost an officer whose strength, energy and integrity of character were invaluable; and the board has lost a member for whose manly character his associates entertained a high personal regard, and upon whose aid in their common duties they have long and confidently relied.

Resolved, That the directors hereby tender to the family of their late associate their heartfelt sympathy in this sudden bereavement.

Resolved, That these resolutions be extended upon the records of the corporation, and a copy of the same be sent to the family of the deceased.

Engineering Association of the South.

At the meeting in Nashville, Tenn., September 14, Mr. W. G. Williamson discussed the relations between the city council, the board of public works and the city engineer. He concluded that in small cities the existence of both the council and the board causes needless complications, though in large cities the great amount of improvements makes the board more efficient than a committee of the council; that the engineer should be appointed by the board, but should not be embarrassed by their appointing any of his assistants; that orders to the engineer should proceed from but one authority, and if these orders are contrary to the engineer's judgment, he should be allowed to put his objections on record, and that it is not good economy to bind an engineer to let work to the lowest bidder.

The Bradbury-Stone Storage Battery.

READ BEFORE THE NATIONAL PHONOGRAPHIC ASSOCIATION, CHICAGO, SEPTEMBER 21, BY HENRY W. MORTON.

The members of this convention need but little information regarding our batteries for phonograph purposes, for most of them have applied the adage that "the proof of the pudding is in the eating." The evolution of storage batteries for phonograph and other purposes has been slow but sure. Patent litigation has prevented their extended adoption for many classes of work. Those unfamiliar with this subject are greatly surprised at the variety of purposes for which they have been adopted, and the Bradbury-Stone Company have been called upon to furnish batteries for many new applications.

One correspondent asks for a type to store up business in prosperous times for use during dull seasons, like the present. Storage batteries have a most interesting application for internal surgical operations. A small incandescent lamp is imbedded just below the cutting point, and the operator is thus enabled to go "by sight, and not by faith." A patient can swallow a small lamp, and, the room being darkened, the working of the "interior economy" is visible, and a remedy applied to the parts affected. To those of us directly connected with the storage battery business, the names of Plante, Faure and Brush are indelibly impressed upon our brain tissue, and the sentence, "active material mechanically applied, in contradistinction to forming by electrical disintegration," haunts us by day and by night. Like all the rest, we have experimented with "electrical disintegration," but we cannot get durable commercial results. We apply the active material mechanically to a plate or grid, which is so molded that the active material is thoroughly protected. After exhaustive tests and experiments, we have come to the conclusion that our form of plate is as mechanically and electrically perfect as it is possible to make it, considering the nature of the only material that it is practical to use, that of lead and its oxides. We are now devoting our best efforts to obtain as great perfection in all the details, such as electrode connections and a form of separator that will prevent, as far as possible, any liability of short circuit or deterioration of active material.

When the batteries are fully charged the specific gravity of the acid should stand 1210. The battery should not be discharged where the hydrometer will show under 1130. In discharging we reduce the specific gravity of the acid, and if below above point, produce invisible salts. If the battery is left standing discharged, a white sulphate makes its appearance. The lower the battery is discharged, naturally the greater the quantity of sulphate.

This sulphate will appear principally upon the faces of the positive plates; it has the effect of insulating that portion of the material which it covers, making the same non-active. The evil resulting from this can be readily understood. For example, if one-half of the plate's surface is covered, and the battery should be put under charge at its ordinary working rate, you are charging a cell that has really only half its working capacity in a healthy condition. The current used is, therefore, just double what it naturally should be; the result is that the current attacks the grid.

The remedy for this evil is, in the first place, never discharge the battery below the point given. Should the battery be in the condition above named, give it a long, low charge; this will remove the sulphate and bring the plates back to a healthy condition.

Storage batteries for phonograph purposes have many and varied conditions to meet that are not met in other lines. They must be able to withstand more or less rough usage, and the "Wandering Jew" could be given points by some of our batteries. You have already made the phonograph speak where no other form of electrical invention has penetrated. Our batteries have been packed upon mules, with your phonograph, over the mountains of North and South America. Together they have encountered the kangaroo and jack rabbit of Australia; even dark Africa has been invaded, and together we may yet find the "missing link" between man and animal. As I come from Boston I should not be true to my intellectual surroundings did I not mention a possible field for the phonograph, and, of course, the Bradbury-Stone batteries. Specialists upon the brain tell us that memory is definite impressions upon the brain tissue. May not an Edison, or a Thomson, or a Tesla, perfect a phonograph that shall project an electrical needle point into these impressions upon the brain tissue, and, as it follows convolution after convolution, we should hear in tragic tones the secrets of many lives, their disappointments and experiences. Think what such a phonograph would do in our courts of law! What a millennium it would bring! No one would even dare think wrongly. Let us go a step farther. It is becoming recognized that some persons are born with a capacity to receive impressions from those who have passed from our sight. They claim to repeat to us messages from departed friends. How much more convincing to hear our friends speak through a purely mechanical, than a human, medium, with a distinct personality, who may involuntarily color the message with that personality. May not the phonograph be so delicately perfected that it would interpret these mysterious impulses from the unseen world? What a relief to some of us it would be for our phonograph to tell us with angel voice, there is no hell fire for you to suffer for all eternity.

I will conclude by saying that the man who uses a poor storage battery will wish he hadn't, like the young miner from Maine out near Denver, who used a large coal shovel for a toboggan, and wished he hadn't. After getting up to a fair rate of speed, his envious friends at the top heard him shout as if in great pain. It seems that the thin shovel blade upon which he was sitting had become heated to a most uncomfortable degree by the friction.

Amazing Advance in the Application of Electricity Since 1876.

How rapid the development of the electrical arts has been within the past few years may be seen by comparing the electrical exhibits at the Centennial Exhibition in Philadelphia in 1876 with those at the Columbian Exposition, now at Chicago. Then electrical apparatus consisted mostly of telegraphic devices, galvanic batteries, static machines, Leyden jars, etc., for school illustrations and measuring instruments, such as galvanometers and resistance coils. There were a few crude dynamos and one small imported Gramme machine, none of them intended to maintain more than one arc light. Now there is rivalry for space in which to exhibit dynamos capable of lighting 50 or more in one circuit. Then there was not a single incandescent lamp in the world. Now they are to be seen by the tens of thousands and with all degrees of brightness, from that of a tallow dip to those but little inferior to the arc itself, and every exhibit is thus lighted. Then there was not a single electrical motor that was more than a toy to be run by a galvanic cell. Now motors for all kinds of service, from driving a fan to those running printing presses, looms, machine shops and threatening the existence of the locomotive itself.

Then all welding was done by hammering at the forge. Now electricity heats the ends to be joined, and, in less time than it takes to describe the process, heavy shafts and rails may be welded even better than was possible before. Then it was not possible to weld steel or other metals than iron. Now almost any metal may be electrically welded to another as easily as iron to iron. Then there were induction coils for producing sparks a few inches long. Now such sparks have been made five feet long, and it is believed could be made 50 feet long if it were worth the while. Then induction coils were employed only for changing low potentials to higher. Now the transformer reverses the process and makes electric lighting feasible miles away from the dynamo. Then it was possible to send but two telegraphic messages in opposite directions simultaneously. Now 72 messages can be sent, 36 in each direction, on one wire without interference. Then the telephone was first exhibited on a line the length of a building. Now one can talk with another a thousand miles away.

Then it was believed that a continuous conductor was essential for doing any kind of electrical work. Now it is shown that all kinds of such work may be done without material connections. Then it was thought that light was one of the physical forces. Now it is believed that light is an electro-magnetic wave. Then it was believed and taught that electricity could never be economically employed for driving machinery, and that its light could not be subdivided. Now, it is believed that electricity is in its infancy. Then all the electrical exhibit could be put in a space 50 feet square. Now a huge building, covering acres, is found insufficient for the needs of exhibitors. All this since 1876.—*Prof. A. E. Dolbear, in the Cosmopolitan.*

Their Telephone.

BY ANNIE HOWELLS FRECHETTE.

"Now, we won't be selfish with our telephone, will we, dear? We will let a few friends use it occasionally—it will be such a pleasure and convenience," and Mrs. Jones stood off and looked admiringly at the new telephone.

"By all means. It is here and it may as well be doing some one service as to stand idle—and I like to feel that a friend isn't afraid to ask a favor of me now and then. Yes, I suppose that telephone will save us many a car fare during the year. You can use it to do your marketing instead of tiring yourself out and wasting half a day three or four times a week, and days when I forget things, think how easy it will be to telephone and remind me! Why, it will entirely do away with the need for strings to tie around my fingers."

"Of course it will. I'm sure that what we'll save on strings and car fare will pay the rent of the instrument," joyously responded Mrs. Jones, who had no great head for figures.

Thus hope and kindly intentions presided at the inauguration of the Joneses' telephone.

Three months had passed and the great invention had carried much information—useful and otherwise—not only to its owners, but to the entire neighborhood as well. There were even days when the Joneses questioned whether they were not running a public telephone, so often did the bell ring. It is true it had not quite paid for itself in the anticipated saving of car fares and finger strings, still it had certainly been a great comfort and "Well, we'll just face the music and call it luxury," said Jones, as he put away the receipt for his first quarter's rent, "especially for our friends," he added, with just a touch of bitterness.

Scarce 24 hours after this philosophical stand was taken Mrs. Jones, who was rather a light sleeper, was aroused by a violent and prolonged ringing. It was six o'clock and Sunday morning—a day and hour usually dedicated to undisturbed slumber. After a brief debate in her mind as to whether the house was on fire or the milkman was ringing she realized that it was the telephone bell. She hastily donned slippers and gown and ran down-stairs. In reply to her interrogative "Yes?" (Mrs. Jones could never bring herself to say "Hello!") came the following, in measured and clerical tones:

"It is Mr. Brown—Rev. Mr. Brown—speaking."

"Oh, yes," instinctively covering her half-clad feet in the folds of her gown.

"I believe you live near Rev. Mr. Smith, and are a member of his church."

"Yes."

"Will you be good enough to send to him and ask if he can spare his curate to Mr. Brown's early service for him, as he is called away? I would be glad if you would send immediately, as I must have his answer within 15 minutes. Thank you. Please call up 1,001," and snap went the telephone.

Mrs. Jones looked at her dishabille and reflected that her one servant was at mass and would not be back for an hour. She went slowly upstairs.

"Tom! Tom, dear, wake up!"

"What is it?"

"Rev. Brown has telephoned to know whether Rev. Smith can send his curate to take his early service."

"Well, what in the world have I got to do with the peddling out of early services?" snapped Jones as he turned and shook up his pillows.

"He has to have an answer to his message within 15 minutes."

"Well, let Susan take it," settling back comfortably.

"But Susan has gone to mass."

"And I suppose that means that I am to be turned out of my bed at daybreak, and canter half a mile," cried Jones in a high and excited voice as he bounced from his bed and began to grope sleepily for his clothes. His toilet was made amid grumblings of "Confound their early services! Why can't they stay in bed like Christians, instead of prowling about and sending men out in the chilly morning air," etc.

Jones' temper was soured for the day, and that night as he was winding his watch he said severely: "Jane, I'm going to draw the line at delivering messages. Tom, Dick and Harry can come here and bellow into the telephone until they are hoarse, but I'll be switched if I'll be messenger boy any longer."

But messages continued to come and go, increasing rather than decreasing in frequency. People in the neighborhood fell into the habit of saying to friends in different parts of the city when leaving a question open: "Just telephone me when you make up your mind. I haven't a telephone myself, but the Joneses have, and they are very obliging about letting me use it."

So the fact that a telephone was owned by an obliging family circulated almost as rapidly as if it had been a lie.

There were times when Mrs. Jones hadn't the face to ask Susan to stop her work and carry these messages, so she carried them herself—trying to keep up her self-respect by combining an errand of her own in the same direction. There were a few messages, however, which remained forever indignantly shut up in the telephone—as, for instance, that of the little girl which came in a shrill, piping voice:

"Mr. Jones, will you send your servant over to Mrs. Graham's to ask Milly where she got that perfectly delicious delight she sent me the other day—and tell her to be quick about it, please, for I am waiting."

And another which came in chuffy, distorted, conversational English, regular "chappie" English, very hard to understand, but which she finally straightened out into: "I say, there—aw—oh—is that Mrs. Jones? Sorry to trouble you—but would you be so awfully good as to send word to Mrs. Bruce—aw—that I'm awfully cut up about it, but I won't be able to dine there to-night. Aw—I wouldn't trouble you, but it's so awfully hot I can't go round to explain to her—you know. Thanks awfully." The telephone was closed and the awfully cut up young man, whose sole claim on Mrs. Jones was that they had once met at a party, was left to be healed by time.

He had for company in his fate the enthusiastic tennis player who, in the midst of "a little summer shower," summoned Mrs. Jones.

"I want to speak to Flannigan, the gardener."

"This is not Flannigan's telephone."

"And who is speaking?"

"Mrs. Jones."

"Oh, well, Mrs. Jones, I can give my message to you just as well. I want you to tell Flannigan to come round and roll the tennis ground at once. He will understand. Tell him right away, please."

"Flannigan does not live here."

"Well, you can send him word, I suppose," in a surprised and offended voice, "to oblige a lady? It is Miss Mortimer who is speaking," and there was an impressive silence. Mrs. Jones remembered Miss Mortimer as a high stepping young woman whom she had met at a friend's house, and who had given her the impression of taking an inventory of her. So Mrs. Jones took pleasure in replying, "Miss Mortimer probably does not know that she is addressing a private telephone. Good day."

But it was Jones, the luckless Jones, who seemed set aside for the cruel buffeting of the telephoning public. One night which he will ever point to as the wildest and wettest night he has known, he had settled himself into his most comfortable chair with a pile of new magazines beside him when he was disturbed by a summons from the telephone. He responded with readiness, for he was rather expecting a call from his partner, and to his cheerful "Hello, old fellow! I'm here," came in a sputtering and wind-tossed voice: Will you please tell Mrs. Goodson that it is so stormy her daughter will not go home to-night?"

Jones turned and confronted his wife, and for a time words refused to come.

"Well, this is a little too much! Now think of an unknown voice barking at me to go out into a storm like this and tell the Goodsons that their daughter will not be home to-night!"

The Goodsons lived just six squares away.

"And what will you do, dear? Why didn't you say plainly that you would not go out into a storm like this; that they must call a messenger?"

"They shut me off without giving me time to answer."

"Well, call them up. Call them up at once."

"Jane, please have some sense. How do I know where Miss Goodson has gadded off to—how do I know what number to call up?"

"Well, I just wouldn't go."

"Oh, I'll have to. They are friends, and if they are expecting that girl of theirs to-night, and she doesn't come, Mrs. Goodson will go out of her mind."

So Jones drove himself forth, clad in righteous indignation and a waterproof coat. The cold rain lashed him and the wind belabored his umbrella, and he was more than once obliged to pause under friendly porches to get his breath. At last the home of the Goodsons was reached, and spent and weary he staggered up the steps. Goodson himself opened the door.

"Hello, Jones, you're no fair weather friend, indeed. Come in, come in."

"No, I'm too wet," he answered, pointedly (and he felt like adding "and too mad"). "I only came to tell you that Miss Goodson won't be at home to-night."

"My daughter! She is at home. Don't you hear her playing the piano now? Come into the vestibule, anyway."

Jones walked in with the rain streaming from his coat.

"Katy!" called Mr. Goodson to his wife. "Here is Jones come to say that Julia won't be home to-night."

"What?" demanded Mrs. Goodson, appearing in the hall and regarding Jones as if he were a mild sort of lunatic, "Julia is at home."

"Well, I don't understand it," said Jones, plaintively. "I was rung up half an hour ago, and asked to come and tell you that your daughter wouldn't be at home on account of the storm."

"And do you mean to say that you stand ready to turn out at all hours and deliver messages free of cost?" cried Goodson.

"It looks that way."

"Well, you are an ass!"

"Don't compliment me too freely, Goodson; I can't take in much more; I'm soaked as it is."

Mrs. Goodson stood thinking. "Who could have been meant! Oh, I've just thought! It must be that Mrs. Goodson who sews for Mrs. Jones and me. And she has a daughter—a typewriter, downtown—and she has friends living in the suburbs. She has doubtless gone there to dinner and concluded to stay all night. But she lives just around the corner from you."

Goodson laughed loudly and brutally. "A bonny sort of a night for a respectable family man like you, Jones, to be skylarking around, carrying messages for typewriting maidens!"

"Oh, come now, that's a little too much!"

"Well, old man, I'll show my gratitude for your friendly intentions toward me by going round to the telephone people the first thing in the morning, and complaining of you. You've no right to be running opposition to the public telephones in this way."

"If you only would!" and Jones wrung his friend's hand, while tears of thankfulness welled up to his eyes.

Once in the street he longed for a contemptuous enemy to kick him briskly to the door of the Widow Goodson. The latter was evidently about to retire, as it was a long time before she responded to his ring. When finally she did come she heard him calmly through and then answered languidly; "Yes, I didn't much expect Bella home to-night, for she said if it came on to rain she thought she'd stay with her cousins. Good night. Quite drizzly, isn't it?" peering out into the darkness.

Full of bitterness Jones turned homeward. It seemed to him that his cup was full, and so it was, for it refused to hold more. As he entered his home, chilled without, but hot within, he was greeted by an unfamiliar voice coming from the regions of the telephone.

"Give me 'Blair's,'" it said. "Is that—Blair's—B-l-a-i-r-'s—do you understand? Oh! yes, it is you, is it, Mrs. Blair? Well, say I want to speak to Miss McCrea—Oh—pshaw! you must know her—she's the young lady that works for you—Oh, she's out, is she? Well, when she comes in tell her Miss Doolan told you to say that Mr. Brennan has broke his leg—she'll know; he drives Judson's horses—and me and Mrs. Judson want to know whether he's to go to the hospital or to his friends. You can send your answer to No. 999. They'll let me know. Give Miss McCrea my love and tell her not to worry about Mr. Brennan. Good-by."

Jones confronted a stately creature as he stepped into the hall.

"Look here, young woman, who are you?"

"I'm Miss Doolan, and I'm stopping at Judson's—as housemaid," she answered, so taken aback that for the moment her self-possession failed her.

"And to whom have you been telephoning?"

"To Blair's—Judge Blair's over on the avenue—a friend of mine stops there."

"Are you in the habit of calling up ladies in that fashion?"

"It's a very good fashion for all I can see," she retorted, impudently.

"And what business have you to order an answer sent here for me to carry on a night like this?"

"Mrs. Judson and me took you for a gentleman, sor, and we thought you wouldn't mind obliging ladies."

"Nor do I, but I don't know either Mrs. Judson or you, and I don't propose running errands for you."

"Oh, then, don't bother yourself, sor—we can hire a boy," she flung back with a scornful laugh as she bounced out.

"Now, Jane, I want you to distinctly understand that the last message has been carried from this house. I have probably to-night sown the seeds of pleurisy and pneumonia broadcast in my system; I have walked 12 squares to deliver a message to the wrong person; we have had a baggage here using our telephone as if it were her own and we have been at the beck and call of the unpaying public for the last six months. Now, if the telephone people are not here by noon to-morrow to threaten legal proceedings against me (Goodson has promised to complain of me) for undermining their business, I shall have that wretched instrument dragged away body and soul and we will try some other form of economy in the future."—*New York Sunday Advertiser.*

Figures on the Recent Tests with the Conduit of the Universal Electric Company.

The following is a letter received by Albert Stetson, Esq., No. 50 Broadway, New York city:

DEAR SIR.—In accordance with your request of yesterday, in regard to the tests made by me on the new electrical conduit and car at Coney Island, I beg to submit the following report:

The insulation resistance of whole line, when the car is not in circuit, equals 61,500 ohms.

The insulation resistance of line, with shoe of car and adjacent switch boxes in contact with shoe submerged in water, equals 380 ohms.

Electromotive force of power circuit equals 353 volts; 353/380 equals .926 ampere loss.

Seventy-five feet of conduit were pumped up full of water previous to test.

With Weston ammeter, the reading was hardly discernable.

The loss on boxes tested by Weston voltmeter showed nothing.

The resistance test was made with Thomson tripod galvanometer and by comparison with standard resistances.

From the above figures the following result is arrived at:

As 75 feet of the conduit were submerged this would include 12 boxes. Therefore, it is safe to assume that the loss was only on those boxes. Several of the dry boxes showed no leakage.

Then, as the loss on the circuit, with boxes all open (that is electrically), was .0058 amperes, equalling .0027 horse-power, the loss on each box equals one-twelfth, which amounts to .000483 amperes, and which equals .000223 horse-power. It, therefore, would take 4,484 boxes entirely submerged to give a loss of 2.113 amperes or one horse-power, and, as the boxes are six feet apart, this equals 5.092 miles.

The car standing with the shoe entirely submerged, and the two adjacent boxes with switches turned on, showed a loss of .926 amperes, equalling .438 horse-power. And, as the car takes about 12 amperes, equals 5.68 horse-power on ordinary track, this shows that it loses 7.69 per cent. of its power when so placed; or, expressed differently, 13 cars placed in the same condition would lose about the same amount of power which it takes to drive one car.

(Signed) E. W. STEVENSON, Electrician,
Brush Electric Illuminating Company.

Trolley Road Employees Arrested for Theft.

Nine motormen and four conductors, employed on the Paterson, N. J., trolley road, were arrested last week on complaint of Manager McAdoo, who charged them with conspiracy and embezzlement, alleging that the stealings were done through the exchange of transfer tickets. The men were arraigned and pleaded not guilty, furnishing bail in the sum of $100 each.

For some time J. W. McLean, a Pinkerton detective, has been in the employ of the company, and, from his own testimony, it was shown that he proposed to the motormen and conductors to league together and defraud the company. He divulged everything to Manager McAdoo, who took steps for the men's arrest. McLean had as an assistant an ex-employé of the road named Amzi Clark, who also acted as a spy.

The accused employés caused the arrest of Manager McAdoo, J. W. McLean and Clark on a charge of conspiring to induce them to steal.

Electrical Engineering in New Zealand.

It is stated that the New Zealand Government is sending an electrical engineer to the Kuastuna Galopelds, Auckland, to inquire into the practicability of utilizing the power of a waterfall, situated about eight miles distant, in the generation of electricity and transmitting the same for the operation of the batteries. There ought to be a good future for electrical engineers in New Zealand. The question of electric power transmission is at present receiving attention in several districts.

The Brush Electrical Engineering Company has carried out several installations in the mining districts of that country, among which may be mentioned those at the Phœnix Gold Mine, Otago; the Brunner Coal Mine, Grey River; and the Sandhills Gold Dredging Company, Otago. We may add that a duty of 20 per cent., *ad valorem*, is leviable upon all electric lighting machinery imported into New Zealand.

ADVANCE INFORMATION.

New Electric Companies Formed and Important Constructions Projected.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

TOLEDO, O.—Detroit and Toledo will soon be connected by an electric railway. The company operating it will be known as The Ohio & Michigan Electric Railway, Light, Power and Heat Company. The capital stock will be placed at $1,000,000, and bonds to that amount have been disposed of. L. K. Parks, J. H. Ainsworth, Ellery Eaton and J. H. Dawson, all of Toledo, are interested. H. J. Warner, of New York city, represents the eastern capital.

BRISTOL, CONN.—The Bristol & Plainville Tramway Company has been organized, and State Senator Noble E. Pierce and C. S. Treadway have been elected president, and secretary and treasurer, respectively. The company hopes to begin construction work this fall.

WESTKILL, N. Y.—Residents of Shandaken, Lexington and Westkill are considering the advisability of building an electric railroad from Shandaken through the Westkill Valley to Lexington, a distance of 14 miles.

ATCHISON, KAN.—The new purchasers of the Atchison street car line will convert the road into an electric railway system.

ALEXANDRIA, VA.—It is reported that the Baltimore Traction Company may purchase the Washington & Arlington electric line and extend it to Falls Church, Va., and Alexandria.

ADRIAN, MICH.—Samuel D. Nesmith is the promoter of a projected electric railway to connect Adrian and Ypsilanti. The company, of which he is the head, has purchased the electric railway lines in Adrian, and also the line connecting Ypsilanti and Ann Arbor. The proposed system will be 62 miles in length, which makes the building of 42 miles of new track necessary. The franchises and rights of way all along have been secured.

LEAVENWORTH, KAN.—Newman Erb has been appointed receiver of the dummy railway line. It is the intention of the receiver to equip the road at once with electric power.

FREDERICK, MD.—The Catoctin Valley Passenger Railway and Power Company has been incorporated. Among the incorporators are those interested in the proposed Frederick and Middletown electric railway, and the object of the new company is to build a short branch of the Frederick and Middletown Railroad to Myersville.

Electric Light and Power.

SAVANNAH, GA.—The city will ask the legislature for authority to erect and operate a municipal electric light plant. The plan is to operate an electric plant in connection with the water works, and to furnish light and power in competition with other companies. The conduit system is proposed.

YOUNGSTOWN, O.—A proposition for the city to issue bonds for $100,000 to establish its own electric light plant is meeting with great favor, and council has ordered that the question be submitted to a vote of the people in November.

ALBANY, N. Y.—A large number of inventors, and several of the big electric companies, have notified the State superintendent of canals of their intention to try various kinds of apparatus on the canals under the law passed last winter, which authorized the use of electricity as a motive power on the canals. The Westinghouse Company has been granted permission to begin experiments with electricity on the canal at Pittsford.

HOPKINSVILLE, KY.—The Hopkinsville Water, Light and Power Company has been incorporated with a capital stock of $23,000.

INDEPENDENCE, MO.—The city has let a contract for electric street lighting.

NEOSHO, MO.—The Rose Electric Light Company, of St. Louis, is endeavoring to secure a franchise to erect an electric light plant in Neosho.

ROCKINGHAM, N. C.—J. E. Duval, of Charlotte, N. C., will arrange for the erection of a central electric light station at Rockingham.

MARLBOROUGH, N. Y.—The Marlborough Electric Light Company, with a capital of $20,000. It will be located at Marlborough, Ulster county, where it will furnish electric light and power. The directors are O. B. Whitney, Moses McMullen, E. E. McNamee, A. A. Sudderly, E. Dayton, G. A. Bodner and W. A. Paltz. There are 200 shares of stock of $100 each.

BELAIR, MD.—The Hughes & Rigby Company, of Baltimore, Md., which holds a contract for lighting Belair by electricity, is investigating the propriety of building an electric railway between Belair and Havre de Grace.

MARIETTA, PA.—The council has awarded the Marietta Electric Light Company a three-year contract for street lighting, and the company will proceed at once to erect the necessary plant.

AURORA, MO.—The Aurora Electric Light and Power Company has been incorporated with a capital of $20,000.

SALISBURY, MD.—The electric light plant which was burned last May has not been rebuilt, and the right, title and good will of same have been sold to R. W. and W. T. Johnson, of Dover, Del. The Messrs. Johnson will bid for the street lighting, and will rewire the entire city, and put in a plant to supply 2,500 lights of 16 candle-power.

LUZERNE, PA.—The West Side Electric Light Company, capital, $10,000, has applied for a charter to supply light, heat and power in the borough of Luzerne. The directors are: John C. Haddock, George W. Shonk and Thomas R. Phillips.

New Telephone Companies.

ANDERSON, S. C.—The Anderson Telephone Exchange; capital, $5,000. Incorporators, J. D. Maxwell, J. K. McCully, D. S. Maxwell and J. L. Mauldin. The company will construct a telephone line and build a telephone exchange in Anderson.

BUFFALO, N. Y.—The Boughton Telephotos Company; capital, $125,000. Directors, George B. Van Vleck, George Sandrock, Albert J. Wheeler, Andrew F. West and William L. Marcy. The company will manufacture a device known as "the Boughton Telephotos," being an instrument designed to communicate by signal between long distances.

Electro-Therapeutists Meet in New York.

The first annual meeting of the National Society of Electro-Therapeutists was held at the Berkeley Lyceum, New York city, last week. The following officers were elected for the ensuing year:

William H. King, of New York, president; W. L. Jackson, of Boston, and F. E. Caldwell, of Brooklyn, vice-presidents; Dr Gardner, of Washington, treasurer, and W H. Bleecker, of Brooklyn, secretary.

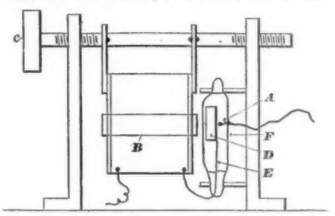


DIAGRAM SHOWING ONE OF MOORE'S METHODS OF CONTROLLING ELECTRIC ENERGY.

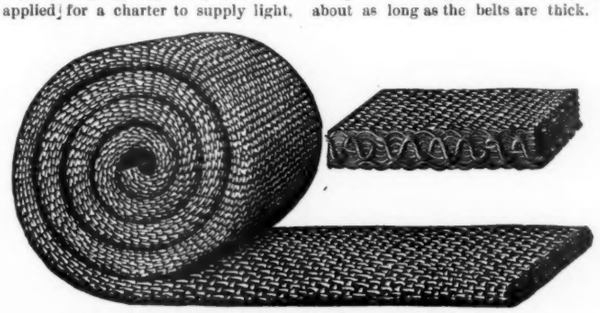
Papers were read by Drs. Harry F. Waite, of New York, F. W. Entriken, of Findlay, O.; R. G. Brown, of Brooklyn, M. B. Finn, of Worcester, Mass., and J. H. Woodward, of Seward, Neb.

The Maddox Cotton and Wire Belting.

Managers of electric light and power plants will doubtless be interested in a novel kind of belting which we illustrate herewith. This belting is manufactured by the Maddox Wire Belt Company, for which Mr. H. N. Green, of 254 to 258 Fulton Street, Brooklyn, N. Y., is general agent.

Cabled soft steel wire and cotton, woven solidly together, form the belt. The cables of wire are each composed of six soft steel wires, twisted together like a cable, giving each separate cable great strength. The cables are laid lengthwise in the belting, about one-eighth of an inch apart, the cables composing about one-half of the warp, the rest of the belt being composed of the strongest, toughest and best cotton yarn, spun especially for this belting.

The cotton filling or woof is woven in solid with the warp (there being no plies to pull apart), the process of weaving causing the wire cables to become corrugated in form, or doubled back and forth through the thickness of the belting, the corrugations being about one-eighth of an inch apart, and about as long as the belts are thick. The cotton woof being woven in solid in the meshes or corrugations of the cable, gives the belts great strength, toughness and flexibility. The weaving of the cotton and wire solidly together completely and thoroughly covers up the wires with the cotton, so that the wire cables do not come in contact with the pulleys at all; the wire cannot be seen in the belting except when it is cut to expose it. The rough surface given to the belting by the cotton forms an elastic, rough face to it, that prevents any air cushions forming between the belt and pulley.



THE MADDOX WIRE AND COTTON BELTING.

Mr. Emile Berliner, of Washington, D. C., is visiting the World's Fair.

A New Method for the Control of Electric Energy.

Mr. D. McFarlan Moore, in a paper on "A New Method for the Control of Electric Energy," recently read before the American Institute of Electrical Engineers, described a very ingenious device. Toward the conclusion of his paper, he states that he hopes this will give a new impulse to investigations leading to the discovery of a more economical method for transforming mechanical motion into light, and an ideal means for controlling electric currents.

The device itself consists mainly in a varying-in-pressure contact in a vacuum, produced by a variable magnetic field, and it is intended to do away with the large existing forms of rheostats, regulators, resistance boxes, controllers, etc. This controller is small in size and is doubly valuable in that it can be applied both to the alternating and the direct current. A simple form of the varying-in-pressure contact is shown in the diagram herewith.

The varying-in-pressure contact is shown at A, caused by the variable magnetic field, due to the movement of the magnet B by thumb screw C. The evacuated bulb F contains the armature D, supported by a spring E, permitting it to vibrate rapidly, producing pulsations or interruptions of the current. The rate or degree of these interruptions depends on the strength of the magnetic field surrounding the armature (in this case acting through the glass), which, in turn, depends on the distance of the magnet from it, varying inversely as the square of the distance. Varying the magnetic field, and, therefore, the pressure on the contacts changes the amperes and volts of the current passing through the device. With properly designed apparatus the movement of the armature is so slight that, to all appearances, one would think it at rest.

This device can be applied to each individual lamp, and the vacuum of the lamp is utilized for the vacuum of the contacts as well. The size of the armature is made as light and small as possible, not only on account of the general law of all mechanical construction, viz., make moving parts as light as is compatible with strength, so that the position of the lamp will have no effect on the incandescence of the filament, but to minimize the amount of residual gas in the metal composing the armature, as any foreign gas will be detrimental to the filament. Sockets of ordinary dimensions may be constructed on the same principle.

This armature is never at rest, being suspended continually, and it is very possible that were a sounding board applied to the lamp when the adjustable contact screw is lightly pressed against the armature while the light is burning at its full candle-power, the vibrations of the armature would be plainly discernable.

The sparking may be relieved in several ways, either by subdividing the current as much as practicable, or by increasing the rapidity of the vibrations the spark is diminished. Other methods may be mentioned, such as magnetic blasts, condensers, non-sparking metals, unlike electrodes, high resistance, sheath of copper around bobbin of magnet, metal foil between layers of magnet, separate coils, etc.

This apparatus is constant, due to its non-susceptibility to temperature changes, and it can be used also as an electric gauge.

There are many forms of this controlling device other than the one illustrated herewith.

In conclusion, the author states that "owing to the immense production of incandescent lamps, the manufacture of evacuated bulbs has been so perfected and cheapened that general current control with this system will probably be many per cent. cheaper than any method now in use" and "that a varying-in-pressure contact could be used with advantage in connection with all delicate measuring instruments, materially aiding in making them 'dead beat,' as it could then be made impossible to strain them by suddenly turning on and off the current."

KINDRED INTERESTS

The Ball Electric Light Company, Limited, Toronto, Ont., Canada, have sent us a very acceptable catalogue illustrating and describing the apparatus and specialties handled by them.

Henry G. Issertel, formerly with Alexander, Barney & Chapin, of New York, has established himself at 39 Cortlandt street, as electrical middleman between manufacturer and consumer. He will make a specialty of electric light and railway supplies.

The Brooklyn Institute of Arts and Sciences has issued a second edition of its prospectus for 1893-94. To those who have limited opportunities for acquiring an education, or who desire instruction in special branches of knowledge, we heartily commend the Brooklyn Institute.

The General Incandescent Arc Light Company, New York, has issued a new series of circulars describing its arc lamps for incandescent circuits. The new "Bergmann" alternating current arc lamp is prominently mentioned. This lamp regulates by means of a single magnet and no dash pot is required.

The Sheffield Car Company, Three Rivers, Mich., have recently made many improvements in their three and four-wheeled hand cars and bicycle cars, all of which are described in new printed matter. A Sheffield velocipede car should be a splendid thing for inspecting electric railway tracks on long roads in process of construction.

The Garvin Machine Company, Laight and Canal streets, New York, have issued a very handsome pocket-size catalogue illustrating and describing their well known machine tools, including plain and universal milling machines, screw machines, turret lathes, drill presses, hand lathes, profilers, cutter grinders, gear cutters, tapping machines and die slotters.

The Chas. Munson Belting Company, 22 to 36 South Canal street, Chicago, manufacturers of pure oak-tanned leather belting, are mailing to their friends and customers a handsomely prepared catalogue describing their products and giving numerous illustrations of plants equipped with Munson belting. A large number of references and testimonials are also included.

Royce & Marean, the well known electrical dealers and contractors of Washington, D. C., are said to be getting out another edition, improved and enlarged, of their catalogue. The genial humor of the senior member of the firm is in evidence throughout the classic text of this catalogue, and will cause it to be sought after in directions not usually interested in catalogue work.

The Electric Appliance Company, of Chicago, is meeting with much success with its new Acme lamp-socket. It has a number of small improvements in the details of construction which are meeting with the approval of the trade, and is making some very large sales. Although late in the season the company reports that it has only a small portion of its stock of fan motors left, and expects by cutting prices to dispose of the balance on hand, soon.

Queen & Company, Incorporated, Philadelphia, have recently received large additional orders from the Armour Institute, of Chicago, for instruments to be supplied from their World's Fair exhibits. This is very gratifying to them, for Professor Stine is a most critical buyer, and insists upon equipping his laboratory with the best apparatus. Substantial orders from other large colleges have also resulted in consequence of the Exposition, where their display is certainly one of the finest to be seen.

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THE **BISHOP.** LEADS.

We can candidly vouch for the superior quality of the Bishop insulation, as it has withstood the weather, falling wires, etc., during our two and a half years' service, without accident or trouble of any nature on our aerial lines or in our house wiring. The severe storm of the winter of 1890-91, which obliged all other plants to "shut down," caused no injury to our alternating circuits.
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JAMES FERGUSON, *Superintendent.*

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THE ELECTRIC RAILWAY IN THEORY AND PRACTICE,
BY OSCAR T. CROSBY AND LOUIS BELL.
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A complete treatise on the construction and operation of electric railways.

While on the question of electric railways, allow us to call your attention to a book by

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with notes on the methods in actual practice for distributing electricity in towns. Diagrams and illustrations of over 30 central stations.
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We have just received from the press

ARITHMETIC OF MAGNETISM AND ELECTRICITY,
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which will be mailed to you on receipt of $1.00. It is a good thing. Address

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13 Park Row, New York.